A COMPARATIVE STUDY ON POSTMASTECTOMY PATIENTS IN REDUCING LYMPHEDEMA WITH & WITHOUT PHYSIOTHERAPY

By

DR.R.MYTHILI

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M.S. DEGREE

BRANCH I - GENERAL SURGERY

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CERTIFICATE

This is to certify that this Dissertation titled "**A COMPARATIVE STUDY ON POSTMASTECTOMY PATIENTS IN REDUCING LYMPHEDEMA - WITH & WITHOUT PHYSIOTHERAPY"** submitted by **Dr.R.MYTHILI** to the faculty of general surgery, The Tamilnadu Dr.M.G.RMedical University, Chennai in partial fulfillment of the requirement for the award of MS Degree (Branch I) General Surgery, is a Bonafide Research Work carried out by her under our direct supervision and guidance from October 2016 to July 2017.

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This is submitted to The Tamil Nadu Dr. M.G.R. Medical University, Chennai, in partial fulfillment of the regulations for the award of M.S Degree (Branch I) in General Surgery.

Place: Madurai

Date : 10-2017 (Dr.R.MYTHILI)

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CONTENTS

INTRODUCTION

Post mastectomy lymphedema is one of the most morbid conditions occurring after breast cancer therapy, causing severe physical, functional and psychological distress to the patient.

With improvements in breast cancer therapy, more women become long time survivors and hence the long term post operative complications and their management become an increasingly important issue. Several therapies have been used to treat lymphedema, but rehabilitative interventions remain the treatment mainstay and exercises play an important role in such rehabilitation. Therefore, we carried out this study to evaluate the effect of an 8-week home-based exercise program of progressive resistance exercises, deep breathing, and self-care on the lymphedema and QOL of postmastectomy patients.

Incidence of secondary arm lymphedema varies from 5 to 56 percent. About 60 percent of patients who undergo axillary lymph node dissection will eventually develop lymphedema. Lymphedema develops when the lymphatic flow is impaired and excess fluid and protein accumulate in the interstitial spaces.

In the acute, early phase of post axillary dissection lymphedema, the swelling is characterized by pitting, which occurs because the extra fluid is relatively free in an easily distensible and large subcutaneous tissue space. At this stage, response to physical measures for edema management is very good.

AIM AND OBJECTIVES

To determine the effectiveness of physiotherapy in reducing the risk of lymphedema after mastectomy. The efficacy of physiotherapy in reducing the lymphedema in postmastectomy patients is compared with control group who did not receive physiotherapy.

REVIEW OF LITERATURE

The review of literature is an integral component of any research. It enhances the depth of knowledge and provides a clear understanding regarding a topic. It refers to an extensive, exhaustive and systematic examination of publications relevant to the research project[2]. This chapter presents a review of selected literature relevant to the study which is discussed under the following headings.

Park J. etal (2008) conducted a study on incidence and risk factors of breast cancer lymphedema among women with breast cancer. A descriptive design with structured questionnaire as a tool was used. It included a sample size of 450 patients who underwent mastectomy. The findings of the study revealed that 24.9% had developed lymphedema and the risk factors were higher staging, modified radical mastectomy, and had axillarynode dissection, received axillary radiotherapy and body mass index greater than 25 kg /m2.[30]

Panobianco M.S.etal (2008) studied the incidence of lymphedema in the first three months after mastectomy. It included 17 samples who underwent mastectomy. The data was collected by means of postoperative follow-up .Edema was detected in 11 women, 9 of which were in mild level and 2 in moderate level. The findings revealed the importance of patient guidance aiming at edema prevention.[44]

Sandra C. Hayes etal (2007) studied lymphedema after breast cancer: incidence, risk factors and effect on upper body function. It included a sample of 287 patients who underwent mastectomy who were evaluated on 5 occasions using bioimpedence spectroscopy, upper body functions was assessed using the validated disability of the arm, shoulder and hand questionnaire. In the findings, 335 of the sample were classified as having lymphedema; of these 40% had long term lymphedema.[33]

Clark B. etal (2005) conducted a study on incidence and risk of arm edema following treatment for breast cancer: a three year follow up study. Prospective observation study was carried out on 251 samples who had surgical treatment for breast cancer. Measurements of limbs were carried out preoperatively and at regular intervals postoperatively. According to the researcher 39 patients(20.7%) had developed lymphedema.[18]

Geller B.M. etal (2003) conducted a study on incidence of lymphedema and associated risk factors in women with invasive breast cancer following surgery. The data was baseline and follow up interview, sample was 145. The findings of the study stated 38% incidence of lymphedema, the risk factors being age above 50, axillary node dissection, received chemotherapy, worked outside the home and had a high household income.[20]

Mary Ann Kosir etal (2000) studied the surgical outcomes after breast cancer surgery: measuring acute lymphedema. The purpose was to measure the onset and incidence of lymphedema among breast cancer survivors using strict criteria for limb evaluation. Thirty women undergoing breast cancer surgery were included. The findings of study revealed that overall 35% of the sample experienced lymphedema by 3 months

Boccardo F.M. etal (2009) conducted a study on prospective evaluation of a preventive protocol for lymphedema following surgery for breast cancer. 55 women who had modified radical mastectomy were included. The preventive protocol included exercises using principles for lymphedema risk minimization. The findings of the study suggested that prophylactic strategies appear to reduce the development of secondary lymphedma and alter its progression.[16]

Sager A., etal (2009) studied on physical activity for the affected limb and arm lymphedema after breast cancer surgery. A prospective, randomized controlled trial with two years follow up. A sample of 204 was included. The patients underwent rehabilitation programme for six months which included moderate resistance exercise. The findings suggested that patients should be encouraged to maintain physical activity without restrictions.[47]

Cinar N. etal (2008) studied the effectiveness of early rehabilitation in patients with modified radical mastectomy. Fifty-seven patients were included who underwent 15 sessions of individual rehabilitation programme. The findings stated that early onset rehabilitation programme after modified radical mastectomy provides improvement in shoulder mobility and functional capacity without causing adverse effect in postoperative period.[39]

Box R. C. etal (2008) conducted a study on physiotherapy after breast cancer surgery: a randomized controlled study to minimize lymphedema. It included 65 women, who were randomly assigned under treatment group and control group. The treatment group underwent physiotherapy intervention programme. The incidence of lymphedema was 11% in treatment group compared to 30% in control group, which stated that these strategies appear to reduce the development of lymphedema and alter its progression.[36]

Lanck etal (2005) studied the effect of a whole body exercise programme on arm volume and arm circumference in women treated for breast cancer. It included a 20 week exercise programme on 16 samples and included exercises such as – seated row, bench press, latissimus dorsi muscle pull-down, rowing, triceps muscle extension, and biceps muscle curl. The findings of the study revealed that women treated for breast

cancer should engage in exercises without fear of developing lymphedema.[26]

Kolden etal (2002) examined the feasibility, safety and benefits of a structured group exercise programme. The sample consisted of 40 women who had been surgically treated for breast cancer. They underwent a 16 week group exercise programme. The findings suggested that exercises reduce the development of lymphedema. [23]

Lee Y. M. etal (2008) conducted a study on lymphedema care of breast cancer patients in a breast cancer clinic: a survey on knowledge and health practice. 171 patients were included. The tool used was self administered questionnaire. The findings revealed that 82.5% of patients knew that they were at risk of developing lymphedema. However, the level of knowledge about preventive care in lymphedema was inadequate, with a mean score of 4.07 out of a full mark of 10.[43]

Rankinen, Sirkku, etal (2007) conducted a study to compare the surgical patients knowledge expectations at admission with knowledge they received during their hospital stay. A descriptive and comparative design was with a structured questionnaire was used on 237 samples. The findings stated that mastectomy patients received less knowledge than they felt they expected.[45]

Rolnick, Sharon, etal (2007) conducted a study on, what women wish they knew before prophylactic mastectomy? A study to assess the knowledge and health practice. They included 967 women and used a structured questionnaire. The findings suggested that more concerns (69%) were related to reconstruction, on the longevity, pain and numbness, prevention of lymphedema, scarring and reconstruction options.[47]

Lee Nelson etal (2002) studied the knowledge about preventing and managing lymphedema. A survey of 148 recently treated breast cancer patients was done. Awareness, current practice and intervention to practice was assessed. The findings suggested that the lymphedema prevention information is not getting to breast cancer survivors in a timely fashion and underscore the urgent need to develop and implement appropriate educational strategies.[42]

FUNCTIONAL ANATOMY OF BREAST

Breast tissue is embryologically derived and anatomically matures as a modified sweat gland.Mammary tissue represent a unique feature of the mammalian species.embryologically,the paired mammary gland congruently develop withinthe milk line which extends between the limb buds from the primodial axilla distally to the inguinal area.Only one pair of mammary gland normally develops in the pectoral region,one gland on each side.

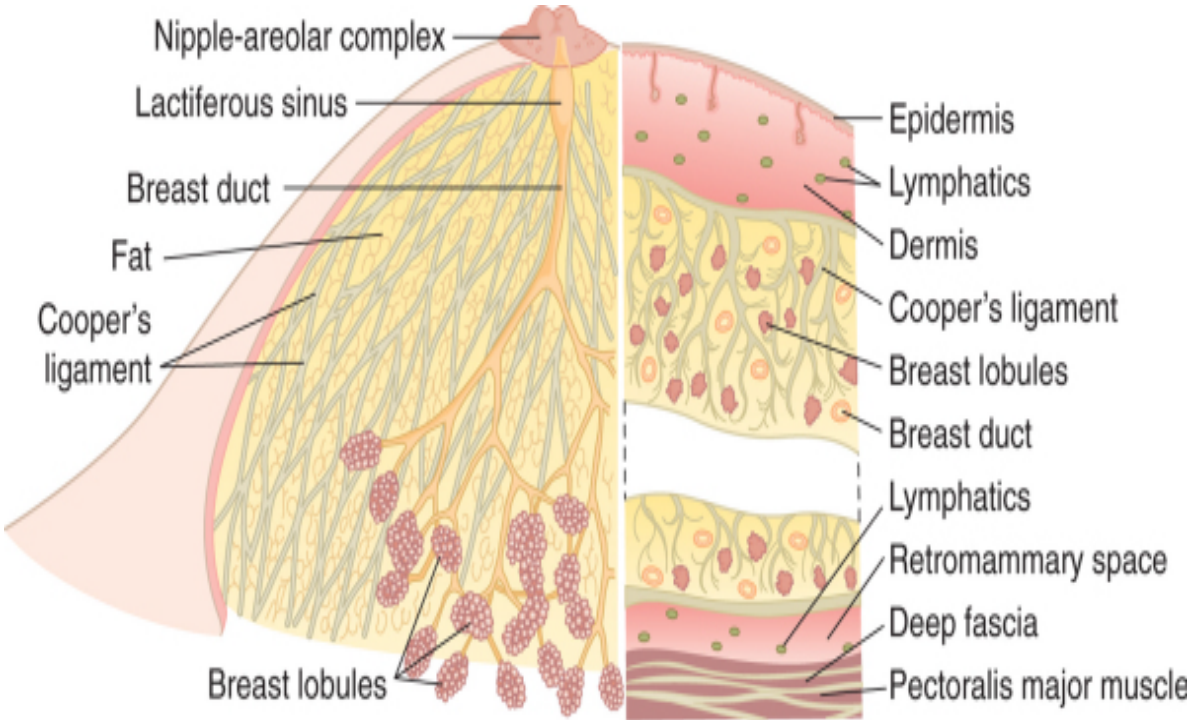


Fig 1.ANATOMY OF BREAST

The adult female breast lies between the second and sixth ribs and between the mid axillary line. Breast tissue frequently extends into the axilla as the axillary tails of Spence.

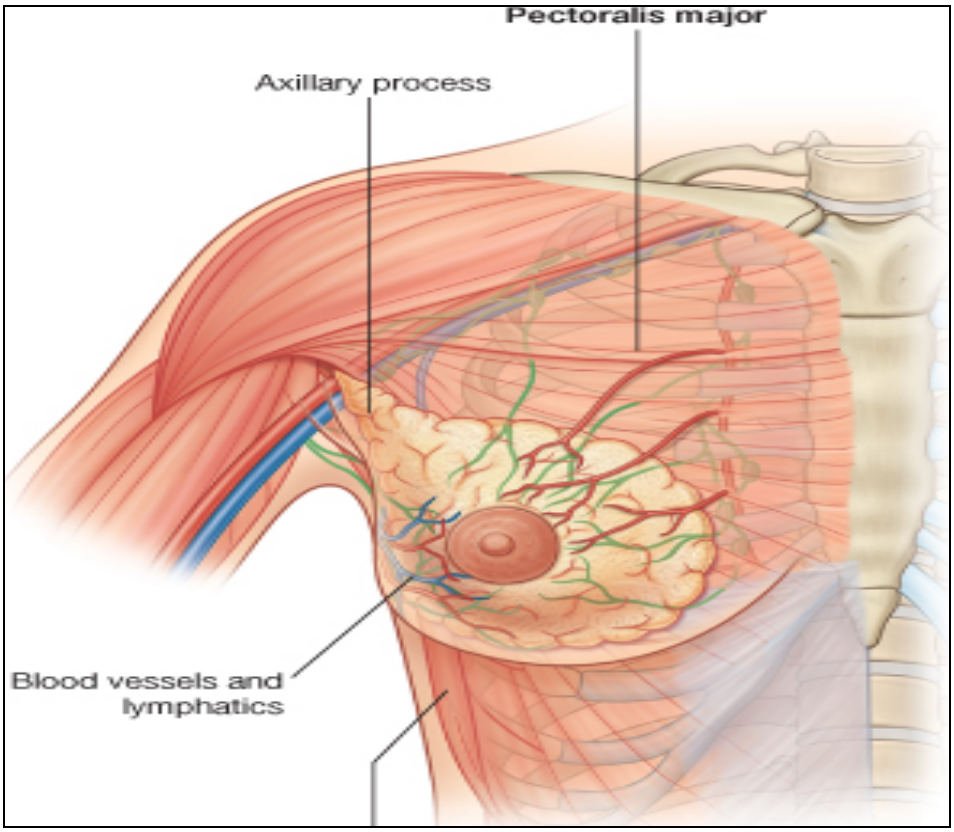


Fig 2.shape and position of breast

Posteriorly, the upper portion of the breast rests on the fascia of the pectoralis major muscle. Inferolaterally it is bounded by the fascia of serratus anterior. Bands of fibrous tissue known as Cooper ligament extend from the fascia to be fibrous tissue of dermis and support the breast.

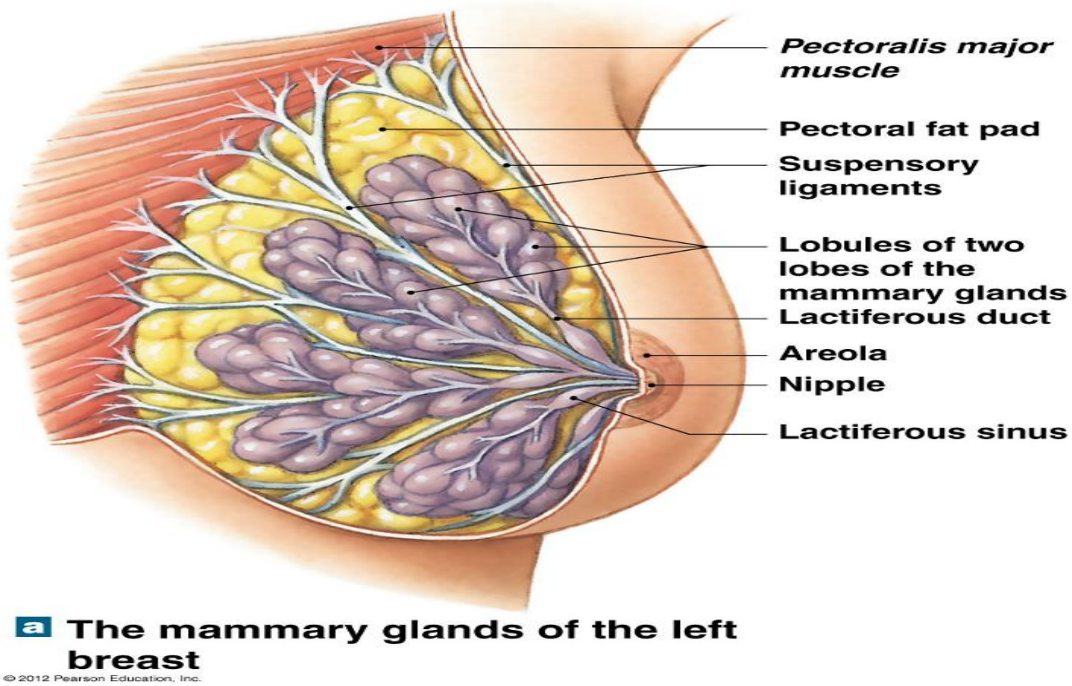


Fig 3 structure of mammary gland

The lobes of the breast are subdivided into lobules which are made up of branched tubulo alveolar glands. Each lobe ends in a lactiferous duct 2 to 4 mm in diameter. Beneath the areola, the lactiferous duct dilate into the lactiferous sinuses and then open through constricted orifice onto the nipple.

From the time of puberty under the influence of hormonal ovarian function begins an intensive development of the mammary glands.

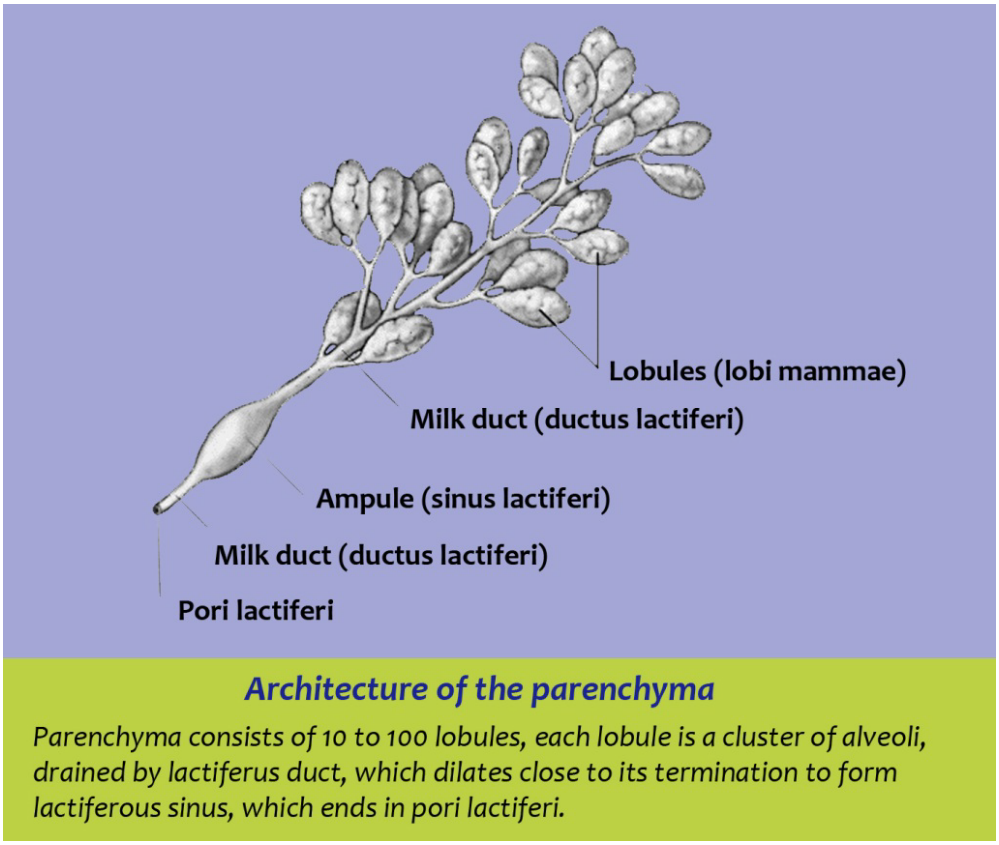


Fig 4 architecture of parenchyma

Supportive structures.

Fat: just under the skin is a layer of fat. Women who have big breasts have more fat surrounding their breast. Fat does not have a role in making breast milk, its function is to surround and protect the milk-making lobules.

Muscle: tissue that connects breasts to ribs, collarbone, and upper arm.

DEFINITIONS

Cooper's Suspensory Ligament *(fibrocollagenous septa)* is a connective tissue in the breast that helps to maintain structural integrity. The ligaments run from the clavicle and the clavi-pectoral fascia branching out through and around breast tissue to the dermis of the skin overlying the breast. The intact ligament suspends the breast from the clavicle and the underlying deep fascia of the upper chest. This has the effect of supporting the breast in its normal position, and maintaining its normal shape. Without the internal support of this ligament, the breast tissue (which is heavier than the surrounding fat) sags under its own weight, losing its normal shape and contour.

Duct

The system of epithelial-lined branching tubes which conducts secretions to the nipple. The largest ducts are located at and below the nipple. The smallest true ducts are the terminal ducts which enter the lobules.

Lobule

A group of ductules and the intralobular portion of the terminal duct arranged in an ovoid formation, and possessed of its own distinctive areolar intralobular stroma.

Ductule

The smallest, blindly ending tubular epithelial structures that make up the resting mammary gland. They arise from the intralobular portion of a terminal duct. A group of ductules and the intralobular portion of the terminal duct form a lobule. The term ductule is reserved for the resting mammary gland. The terms acini or alveoli are reserved for the same or similar structures which show secretory activity in the prelactating and lactating gland.

Alveoli or acini

A term reserved for ductule-like terminal secretory units present in the prelactating and lactating mammary gland

Nipple-Areola Complex.

The epidermis of the nipple-areola complex is pigmented and is variably corrugated. During puberty, the pigment becomes darker and the nipple assumes an elevated configuration. Throughout pregnancy, the areola enlarges and pigmentation is further enhanced. The areola contains sebaceous glands, sweat glands, and accessory glands, which produce small elevations on the surface of the areola (Montgomery's tubercles). Smooth muscle bundle fibers, which lie circumferentially in the dense connective tissue and longitudinally along the major ducts, extend upward into the nipple, where they are responsible for the nipple erection that

occurs with various sensory stimuli. The dermal papilla at the tip of the nipple contains numerous sensory nerve endings and Meissner's corpuscles. This rich sensory innervation is of functional importance, because the sucking of the infant initiates a chain of neurohumoral events that results in milk letdown.

Inactive and Active Breast. Each lobe of the breast terminates in a major (lactiferous) duct (2–4 mm in diameter), which opens through a constricted orifice (0.4–0.7 mm in diameter) into the ampulla of the nipple. Immediately below the nipple-areola complex, each major duct has a dilated portion (lactiferous sinus), which is lined with stratified squamous epithelium. Major ducts are lined with two layers of cuboidal cells, whereas minor ducts are lined with a single layer of columnar or cuboidal cells. Myoepithelial cells of ectodermal origin reside between the epithelial cells in the basal lamina and contain myofibrils. In the inactive breast, the epithelium is sparse and consists primarily of ductal epithelium. In the early phase of the menstrual cycle, minor ducts are cordlike with small lumina. With estrogen stimulation at the time of ovulation, alveolar epithelium increases in height, duct lumina become more prominent, and some secretions accumulate. When the hormonal stimulation decreases, the alveolar epithelium regresses.

With pregnancy, the breast undergoes proliferative and developmental maturation. As the breast enlarges in response to hormonal stimulation, lymphocytes, plasma cells, and eosinophils accumulate within the connective tissues. The minor ducts branch and alveoli develop. Development of the alveoli is asymmetric, and variations in the degree of development may occur within a single lobule . With parturition, enlargement of the breasts occurs via hypertrophy of alveolar epithelium and accumulation of secretory products in the lumina of the minor ducts. Alveolar epithelium contains abundant endoplasmic reticulum, large mitochondria, Golgi complexes, and dense lysosomes. Two distinct substances are produced by the alveolar epithelium: (a) the protein component of milk, which is synthesized in the endoplasmic reticulum (merocrine secretion); and (b) the lipid component of milk (apocrine secretion), which forms as free lipid droplets in the cytoplasm. Milk released in the first few days after parturition is called *colostrum* and has low lipid content but contains considerable quantities of antibodies. The lymphocytes and plasma cells that accumulate within the connective tissues of the breast are the source of the antibody component. With subsequent reduction in the number of these cells, the production of colostrum decreases and lipid-rich milk is released.

PHYSIOLOGY OF THE BREAST

Breast Development and Function

Breast development and function are initiated by a variety of hormonal stimuli, including estrogen, progesterone, prolactin, oxytocin, thyroid hormone, cortisol, and growth hormone.

Estrogen, progesterone, and prolactin especially have profound trophic effects that are essential to normal breast development and function. Estrogen initiates ductal development, whereas progesterone is responsible for differentiation of epithelium and for lobular development. Prolactin is the primary hormonal stimulus for lactogenesis in late pregnancy and the postpartum period. It upregulates hormone receptors and stimulates epithelial development. the secretion of neurotrophic hormones from the hypothalamus, whichis responsible for regulation of the secretion of the hormones that affect the breast tissues. The gonadotropins luteinizing hormone (LH) and follicle-stimulating hormone (FSH) regulate the release of estrogen and progesterone from the ovaries. In turn, the release of LH and FSH from the basophilic cells of the anterior pituitary is regulated by the secretion of gonadotropinreleasing hormone (GnRH) from the hypothalamus. Positive and negative feedback effects of circulating estrogen and progesterone regulate the secretion of LH, FSH, and GnRH. These hormones are responsible for the development, function, and

maintenance of breast tissues . In the female neonate, circulating estrogen and progesterone levels decrease after birth and remain low throughout childhood because of the sensitivity of the hypothalamic-pituitary axis to negative feedback from these hormones. With the onset of puberty, there is a decrease in the sensitivity of the hypothalamic-pituitary axis to negative feedback and an increase in its sensitivity to positive feedback from estrogen. These physiologic events initiate an increase in GnRH, FSH, and LH secretion and ultimately an increase in estrogen and progesterone secretion by the ovaries, leading to establishment of the menstrual cycle. At the beginning of the menstrual cycle, there is an increase in the size and density of the breasts, which is followed by engorgement of the breast tissues and epithelial proliferation. With the onset of menstruation, the breast engorgement subsides and epithelial proliferation decreases.

Blood Supply, Innervation, and Lymphatics.

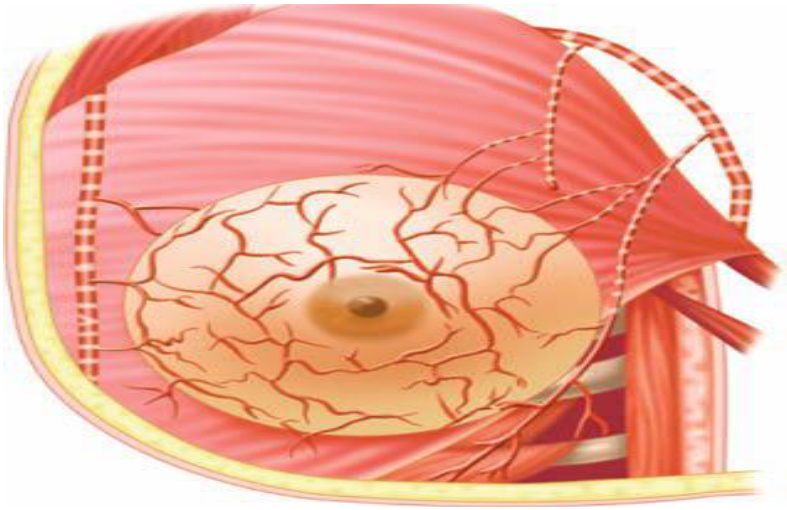


fig 5 : ARTERIAL SUPPLY OF BREAST

The breast receives its principal blood supply from: (a) perforating branches of the internal mammary artery; (b) lateral branches of the posterior intercostal arteries; and (c) branches from the axillary artery, including the highest thoracic, lateral thoracic, and pectoral branches of the thoracoacromial artery .The second, third, and fourth anterior intercostal perforators and branches of the internal mammary artery arborize in the breast as the medial mammary arteries. The lateral thoracic artery gives off branches to the serratus anterior, pectoralis major and pectoralis minor, and subscapularis muscles. It also gives rise to lateral mammary branches.

The veins of the breast and chest wall follow the course of the arteries, with venous drainage being toward the axilla. The three principal groups of veins are:

(a) perforating branches of the internal thoracic vein,

(b) perforating branches of the posterior intercostal veins,

(c) tributaries of the axillary vein. Batson's vertebral venous plexus, which invests the vertebrae and extends from the base of the skull to the sacrum, may provide a route for breast cancer metastases to the vertebrae, skull, pelvic bones, and central nervous system. Lymph vessels generally parallel the course of blood vessels.

Lateral cutaneous branches of the third through sixth intercostals nerves provide sensory innervation of the breast (lateral mammary branches) and of the anterolateral chest wall. These branches exit the intercostal spaces between slips of the serratus anterior muscle. Cutaneous branches that arise from the cervical plexus, specifically the anterior branches of the supraclavicular nerve, supply a limited area of skin over the upper portion of the breast. The intercostobrachial nerve is the lateral cutaneous branch of the second intercostal nerve and may be visualized during surgical dissection of the axilla. Resection of the intercostobrachial nerve causes loss of sensation over the medial aspect of the upper arm.

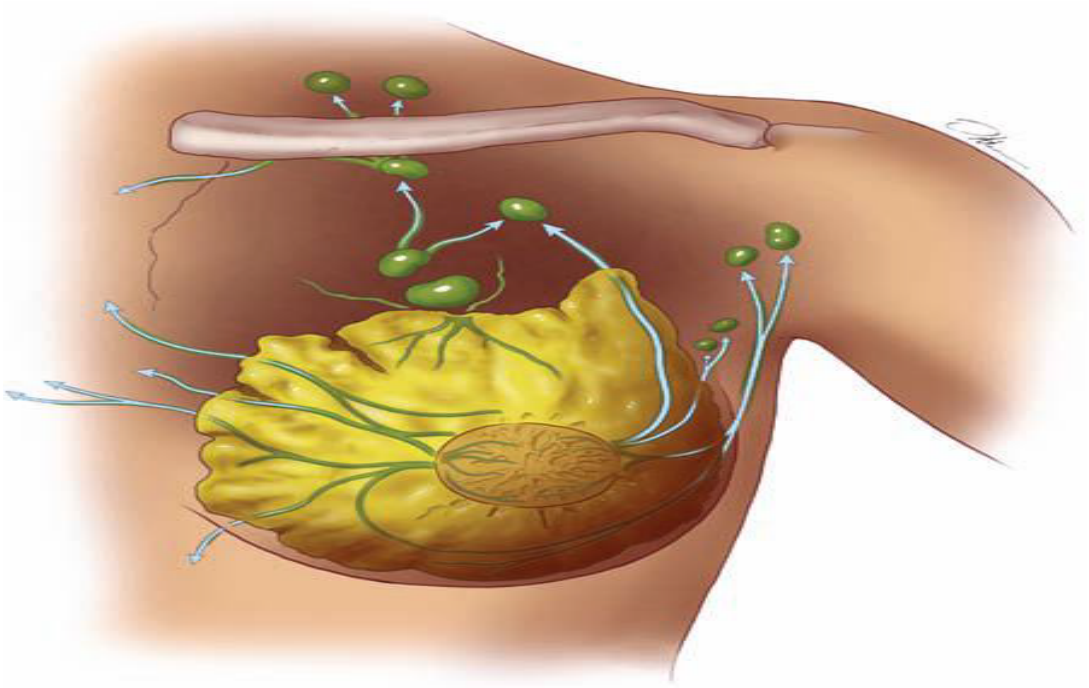


Fig - 6 lymphatic supply of breast

The boundaries for lymph drainage of the axilla are not well demarcated, and there is considerable variation in the position of the axillary lymph nodes. The six axillary lymph node groups recognized by surgeons are: (a) the axillary vein group (lateral), which consists of four to six lymph nodes that lie medial or posterior to the vein and receive most of the lymph drainage from the upper extremity; (b) the external mammary group (anterior or pectoral group), which consists of five to six lymph nodes that lie along the lower border of the pectoralis minor muscle contiguous with the lateral thoracic vessels and receive most of the lymph drainage from the lateral aspect of the breast; (c) the scapular group (posterior or subscapular), which consists of five to seven lymph nodes

that lie along the posterior wall of the axilla at the lateral border of the scapula contiguous with the subscapular vessels and receive lymph drainage principally from the lower posterior neck, theposterior trunk, and the posterior shoulder; (d) the central group, which consists of three or four sets of lymph nodes that are embedded in the fat of the axilla lying immediately posterior to the pectoralis minor muscle and receive lymph drainage both from the axillary vein, external mammary, and scapular groups of lymph nodes, and directly from the breast; (e) the subclaviculargroup (apical), which consists of six to twelve sets of lymph nodes that lie posterior and superior to the upper border of the pectoralis minor muscle and receive lymph drainage from all of the other groups of axillary lymph nodes; and (f) the interpectoral group (Rotter's lymph nodes), which consists of one to four lymph nodes that are interposed between the pectoralis major and pectoralis minor muscles and receive lymph drainage directly from the breast. The lymph fluid that passes through the interpectoral group of lymph nodes passes directly into the central and subclavicular groups. the lymph node groups are assigned levels according to their anatomic relationship to the pectoralis minor muscle. Lymph nodes located lateral to or below the lower border of the pectoralis minor muscle are referred to as *level I lymph nodes,* which include the axillary vein, external mammary, and scapular groups. Lymph

nodes located superficial or deep to the pectoralis minor muscle are referred to as *level II lymph nodes,* which include the central and interpectoral groups. Lymph nodes located medial to or above the upper border of the pectoralis minor muscle are referred to as *level III lymph nodes,* which consist of the subclavicular group.

The plexus of lymph vessels in the breast arises in the interlobular connective tissue and in the walls of the lactiferous ducts and communicates with the subareolar plexus of lymph vessels. Efferent lymph vessels from the breast pass around the lateral edge of the pectoralis major muscle and pierce the clavipectoral fascia, ending in the external mammary (anterior, pectoralgroup of lymph nodes. Some lymph vessels may travel directly to the subscapular (posterior, scapular) group of lymph nodes.From the upper part of the breast, a few lymph vessels pass directly to the subclavicular (apical) group of lymph nodes. The axillary lymph nodes usually receive >75% of the lymph drainage from the breast. The rest is derived primarily from the medial aspect of the breast, flows through the lymph vessels that accompany the perforating branches of the internal mammary artery, and enters the parasternal (internal mammary) group of lymph nodes.

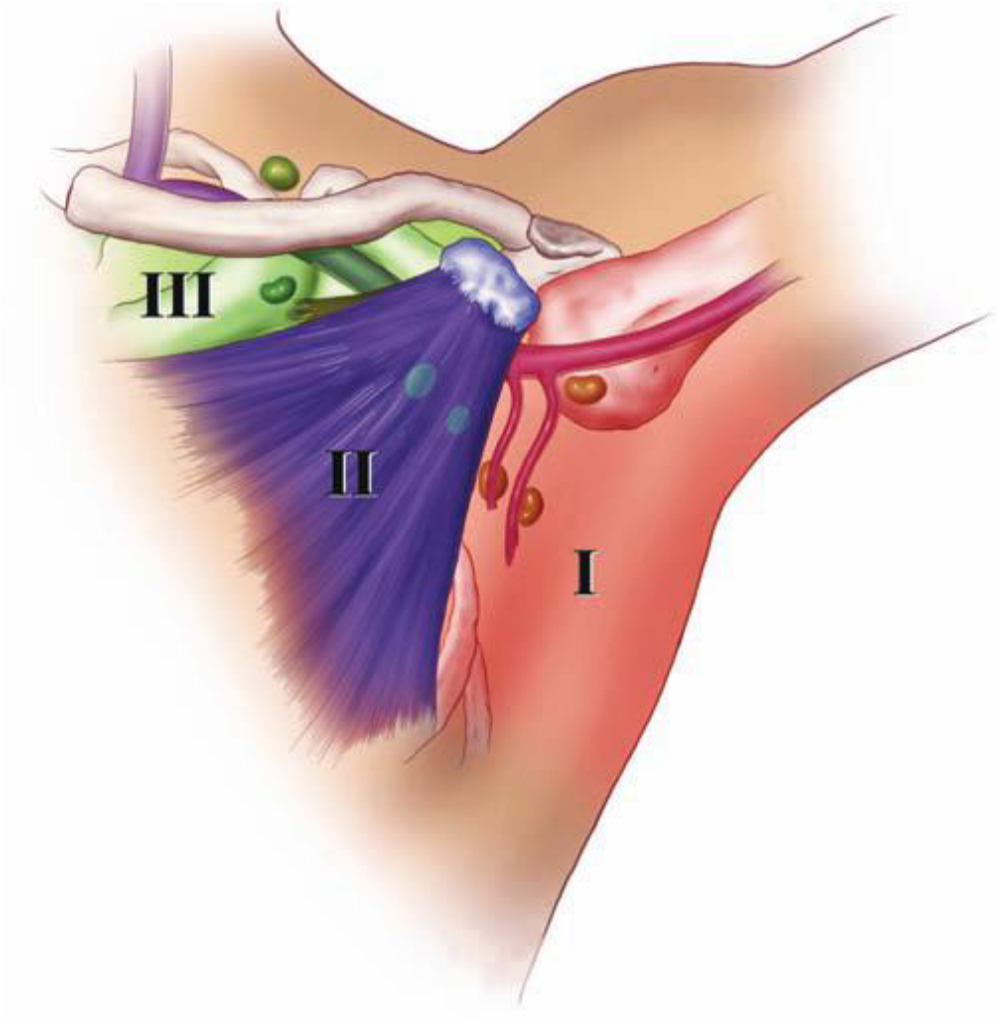


Fig 7 : Lymphnode level in axilla

INVASIVE CARCINOMA

Pathology

Invasive carcinomas are defined as those in which tumor cells,have crossed the basement membrane and have the biologic capability to metastasize. Any breast lesion that is surgically removed should be considered potentially malignant. Breast biopsy specimens should be oriented in the operating room and inked before sectioning so that the margin status can be assessed. The pathologic evaluation of a breast tumor should routinely include size, histologic type, grade, margin status,hormone receptor, and HER2 status.

Histologic Type

Infiltrating ductal carcinoma is the most common type of breast carcinoma, accounting for 65% to 80% of all cases of breast cancer. Microscopically, infiltrating ductal carcinomas vary widely in appearance and often have features of other histologic subtypes of breast cancer, with areas of lobular, medullary, or tubular differentiation. For prognostic purposes,these mixed tumors are considered to be infiltrating ductal carcinomas.

Infiltrating lobular carcinoma is the second most frequently encountered subtype of invasive carcinoma. Approximately 10% of cancers are classified as lobular. Histologically, lobular cancers grow as a

single file of malignant cells that tend to be arranged circumferentially around ducts and lobules. Because of this growth pattern, they are often difficult to recognize on clinical examination and mammography because they may not produce the distinctive mass lesions characteristic of infiltrating ductal carcinomas. Infiltrating lobular carcinoma has been said to have a rate of bilaterality as high as 30% to 50%. When patients with LCIS are excluded from consideration, however, the incidence of contralateral breast cancer in patients with infiltrating lobular carcinoma differs little from that in patients with ductal carcinoma. In one study of 4,748 patients, a contralateral cancer had developed after 5 years in 5.3% of patients with infiltrating lobular cancer, and in 4.0% of those with infiltrating ductal tumors.156 Thus, the routine use of bilateral mastectomy for patients with tumors of lobular histology cannot be justified. Lobular carcinoma is more likely to metastasize to the intraabdominal viscera, uterus, ovaries, and peritoneal surfaces than other histologic types of breast carcinoma. Most studies have found no difference in survival between patients with infiltrating ductal and those with lobular carcinoma after stratification for appropriate prognostic factors. Favorable histologic subtypes of breast carcinoma include pure tubular and mucinous carcinoma. Tubular carcinomas form normal-appearing breast ductules or

tubules. At least 75% of a tumor must be tubular to be classified in this subtype.

Tubular carcinomas are uncommon, accounting for 2% or fewer of all cancers, although they are more frequent in women undergoing screening mammography. Their significance lies in their excellent prognosis. Nodal metastases are extremely rare in tubular carcinomas smaller than 1 cm, and even when nodal metastases do occur, the prognosis is much better than that for ductal or lobular carcinoma at the same stage. Mucinous or colloid carcinomas are also uncommon. They are characterized by relative acellularity and large pools of extracellular mucus. The prognosis is similar to that for tubular carcinoma. Medullary carcinoma is another variant of infiltrating ductal carcinoma with a favorable prognosis, although this is less well recognized than in tubular and mucinous tumors, perhaps because of the aggressive microscopic appearance of medullary carcinoma. The tumor cells have large pleomorphic nuclei and a high mitotic rate, and are associated with an intense lymphoplasmacytic infiltrate. Grossly, the tumors are well circumscribed and may be mistaken for benign lesions. Medullary carcinomas are less likely to be associated with axillary nodal metastases than ductal or lobular carcinomas of the same size.

TNM Staging (AJCC Cancer Staging Manual, 2002,

Sixth Edition) Tumour:

Tx – Tumour cannot be assessed.

T0 – No evidence of primary.

Tis – Carcinoma *in situ* (DCIS or LCIS)

Tis Paget's – Paget's disease of nipple with no tumour (with

tumour underneath is staged according to size)

T1 mic – Microinvasion < 0.1 cm.

T1— Tumour size < 2 cm in greatest diameter (T1a—0.1-0.5

cm; T1b—0.5-1.0 cm; T1c—1-2 cm).

T2 – Size 2-5 cm.

T3 – Size > 5 cm.

T4 – Tumour fi xed to chest wall or skin (T4a—fi xed to chest

wall, T4b—fi xed to skin, T4c-T4a + T4b, T4d—inflammatory ca breast).

Node:

NX – Nodes cannot be assessed.

N0 – No nodes.

N1 mic – Node with micrometasiasis.

N1 – Axillary nodes—ipsilateral, mobile, discrete.

N2 –

N2a – Axillary nodes—ipsilateral fixed to one another and other structures.

N2b – *Clinically apparent** and ipsilateral internal mammary nodes in the absence of clinically palpable axillary nodes.

* *Clinically apparent* means nodes detected by imaging/clinically/ pathologically.

N3 –

N3a – Spread to ipsilateral infraclavicular lymph nodes with or without axillary nodes.

N3b – Spread to ipsilateral internal mammary nodes and axillary nodes.

N3c – Spread to ipsilateral supraclavicular lymph nodes with/ without axillary or internal mammary nodes.

Metastasis:

MX – Metastases cannot be assessed.

M0 – No metastasis.

M1 – Distant Metastases.

Stage I : T1N0M0

Stage IIa : T0N1M0; T1N1M0; T2N0M0.

Stage IIb : T2N1M0; T3N0M0

Stage IIIa : T0N2M0; T1N2M0; T2N2M0; T3N1M0; T3N2M0

Stage IIIb : T4N0M0; T4N1M0; T4N2M0

Stage IIIc : Any TN3M0

Stage IV : Any T, any N, M

Early breast cancer—Stage I and II; T1N1, T2N1; T3N0

Locally advanced breast cancer (LABC)—Stage IIIA, IIIB

Metastatic breast cancer—Stage IV

Modified radical mastectomy [MRM]:

***Patey's operation*:** It is total mastectomy along with clearance of all levels of axillary nodes and removal of pectoralis minor muscle. It is enblock dissection of breast and axilla. An elliptical incision is made from medial aspect of the second and third intercostal space enclosing the nipple, areola and tumour extending laterally into the axilla along the anterior axillary fold. Upper and lower skin fl aps are raised. Breast with tumour is raised from the medial aspect of the pectoralis major muscle. Dissection is proceeded laterally with ligating pectoral vessels. Once dissection reaches axilla, lateral border of pectoralis major muscle is cleared with level I nodes. Pectoralis minor is divided from coracoid process to clear level II nodes. Medial and lateral pectoral nerves should be preserved (otherwise atrophy of pectoralis minor muscle occurs). Later from the apex of axilla level III nodes are cleared. Nerve to serratus anterior, nerve to latissimus dorsi, intercostobrachial nerve, axillary vein, cephalic vein and pectoralis major muscle are preserved. Wound is closed with a suction drain.

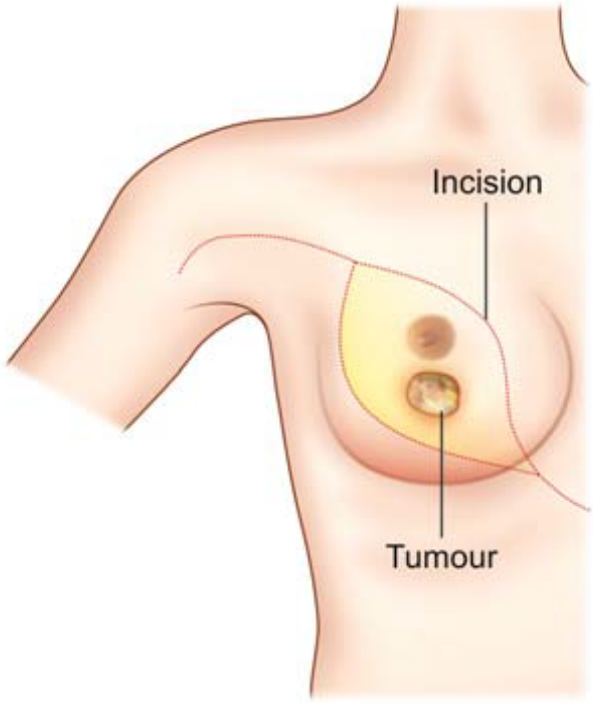


Fig 8 : Incision for MRM

Scanlon's operation: Is a modified Patey's operation wherein instead of removing pectoralis minor, it is incised to approach the affected level III lymph nodes.

Auchincloss modified radical mastectomy: Here pectoralis minor muscle is left intact and level III lymph nodes are not removed—*commonly done now.*

Mastectomy specimen should be carefully inspected and sent to pathology department

_ Specimen is sent in formalin for histology.

_ It is sent in saline in low temperature for ER/PR/Her 2 neu status study (histochemistry).

_ Specimen mammography is often done.

_ Tumour grading, tumour clearance, nodal involvement—its number and capsular breach are assessed histopathologially.

LYMPHEDEMA

Lymphedema is defined as an abnormal accumulation of tissue proteins, edema, and chronic inflammation within an extremity.' Persons with this condition may have significant problems, including discomfort, impaired extremity function, and unsatisfactory cosmesis. The early recognition of postmastectomy lymphedema may spare patients unnecessary neglect, lack of information, and delayed implementation of a comprehensive treatment program. The term "postmastectomy lymphedema" is inaccurate in that lymphedema affecting the arm is also found in women treated with axillary node dissection or radiation therapy, as well as in those treated with radical and modified radical mastectomy.Lymphedema may be classified as either primary or secondary.

Primary lymphedema is typically seen in young females. It is characterized by diffuse swelling of the lower extremities. Primary lymphedema results from defects in the lymphatic system and is often recognized at birth. Conditions of lymphatic aplasia, hypoplasia, and hyperplasia have been identified. The terms "lymphedema praecox" and "lymphedema tarda" have been applied to persons who manifest these symptoms during their second and third decades of life. Secondary or

acquired lymphedema can be associated with cancer, infection, inflammation, radiation, surgery, or trauma.

PATHOPHYSIOLOGY

Normal Fluid Dynamics

Interstitial fluid within a limb is maintained in balance by several interacting mechanisms'. The capillary wall, for example, is selectively permeable and prevents larger plasma colloids from freely exiting into the interstitial space;thus, intravascular oncotic pressure is created which tends to maintain fluid within the capillary. Countering this is the osmotic pressure created by substances within the interstitial space. Likewise, there is hydrostatic pressure within the capillary which encourages filtration across the capillary wall. Hydrostatic pressure may be increased or reduced, depending on the position of the limb relative to the heart. This is affected further by the shear number of capillaries and the total extracellular volume. Finally, the lymphatic system additionally assists in maintaining the balance of interstitial fluid.

Normal Lymphatic System

The lymphatic system consists of a large network of vessels and glands. The vessels are found in almost every body organ containing blood vessels. Though the number of lymphatic vessels in any organ exceeds the number of veins, their size is much smaller and they are considered almost "delicate."' There is both a superficial and a deep system of lymphatic vessels within the arm. Smaller, superficial lymphatic vessels accompany the superficial veins, and larger lymphatics accompany the deep blood vessels.Lymphatic vessels pass through numerous lymph nodes before the majority of them empty into the thoracic duct. Lymph is then returned to the circulation by being emptied into the left subclavian vein. The lymphatic vessels of the right arm terminate in the right lymphatic duct, which empties into the right subclavian vein. The lymphatic glands of the upper extremity are divided into a superficial set that is located at the elbow and between the deltoid and pectoralis major muscles. The other set is the deep lymphatic glands, which are in the axilla, forearm,
and arm.

Edema and Lymphedema

Edema is “the accumulation of interstitial fluid in abnormally large amounts.” There are many possible causes for Edema.

Factors Associated With increased Edema Formation

I. Increased capillary Pressure

A. Excessive kidney retention of salt and water

B. High venous pressure

1. Heart failure

2. Local venous block

3. Failure of venous pumps

(a) Paralysis of muscles

(b) Immobilized parts of body

(c) Failure of venous valves

II. Decreased plasma Proteins

A. Loss of proteins in urine (nephrosis)

B. Loss of proteins from denuded skin areas

1. burns

2. Wounds

C. Failure to produce proteins

1. Liver disease

2. Serious protein or caloric malnutrition

III. Increased Capillary Permeability

A. Immune reaction that cause release of histamine and other immune products

B. Toxins

C. Bacterial infections

IV. Blockage of lymph Return

A. Blockage of lymph nodes by cancer

B. Blockage of lymph nodes by infection, especially with filaria nematodes

Fiildi et al have stated that “chronic postmastectomy swelling of the arm is always due to a disease of the lymphatic and never to that of the venous system.” Postmastectomy lymphedema is considered to be a secondary form of lymphedema. The edema may arise from either direct tumor effects on the lymphatics or the indirect irilpact of antineoplastic therapies.” Treatment of the tumor through resection may injure the lymphatic vessels and nodes. Radiation therapy may cause fibrosis around these structures, interfering with their function. Finally, metastasis to the axillary area can block and disrupt lymphatic function. In the acute, early phase of postaxillary dissection lymphedema, the swelling is characterized by pitting, which occurs because the extra fluid is relatively free in an easily distensible and large subcutaneous tissue space. At this stage, response to physical measures for edema management is very good.

However, as time passes, the fluid becomes more enmeshed in the subcutaneous connective tissue structure and is less free to move. Therefore, as the edema becomes chronic, it is less likely to pit and it becomes brawny. Though physical measures may still be effective at this point, the magnitude of improvement will likely be less and more treatments will be required to obtain significant benefit from therapy.

Complications

Full joint range of motion about the elbow, wrist, and hand requires distensible subcutaneous tissue about the joint. With increasing lymphedema, this capacity of the subcutaneous tissue to distend is lost and movements of the joints in the involved area become stiff and their overall range decreases. Joint range of motion is also negatively affected by the shear increase in mass. This lost range, coupled with the increased fluid tension in the subcutaneous tissue, can cause symptoms ranging from discomfort to outright pain in the lymphedematous arm. The decreased range and the pain can affect arm use in functional activities of self-care and work. In addition to loss of range and the potential for pain, the edematous arm can be difficult to clothe and become cosmetically displeasing. These problems can create added emotional distresses and social barriers. A prospective survey of lymphedema patients found increased levels of emotional distress in patients with pain or edema in the

dominant hand, those with avoidance coping styles, and those with low social support."

The edema also compromises the health of the cutaneous and subcutaneous tissue and thereby increases the risk of infection with injury and decreases the healing capacity of the tissue. Recurrent cellulitis may further aggravate the edema formation by creating the potential for more scarring of the subcutaneous tissue and fibrin deposition. Lymphangiosarcoma has been associated with chronic lymphedema; it is extremely rare but is aggressively malignant. Annual follow-up should include thorough skin assessment

Therefore, although postmastectomy lymphedema may not be a medical emergency, timely and adequate treatment is medically justified, given that delayed intervention increases the potential for complications and for difficulty in achieving improvement.

ASSESSMENT

Symptoms and physical findings become clinically detectable as subcutaneous fluid pressure increases. Various systems for measuring and classifying postmastectomy lymphedema have been proposed. Tracy et al have classified postmastectomy lymphedema by the absolute increase in volume of the affected extremity in comparison with the normal limb . Segerstrom et al" noted that patients with brachial edema did not notice

any symptoms until the volume difference between the two arms was 200ml or more. Stillwell' has suggested a classification based on the percentage increase in volume of the involved limb rather than the absolute volume.

Three stages of lymphedema have been described. Stage one, in which the edema is pitting, is purportedly reversible with elevation of the arm.

Stage two, which is not considered to be "spontaneously reversible," constitutes protein-rich edema and a proliferation of connective tissues. This causes progressive hardening of the extremity, and elevation does not reduce edema.

Stage three is lymphostatic elephantiasis, which may have cartilage-like hardening and papillomatous outgrowth of the skin.

Laboratory tests to evaluate lymphedema include sodium- 24 studies, lymphoscintigraphy, lymphangiography,computed tomography, and optoelectronic volumetry. Lymphoscintigraphy is an effective test for assessment of the lymphatic system, but its routine use in evaluating postmastectomy arm edema is controversial.'7 Lymphangiography should be reserved for surgical candidates and is not recommended for routine evaluation of patients with acquired lymphedema. Computed tomography can demonstrate a shift in fluid volume in the various tissue compartments

as well as reveal structural changes in the soft tissue. By measuring the relative disappearance of isotope from affected patients, sodium-24 studies allow measurement of local circulation and determination of the extent of edematous fluids. Optoelectronic volumetry allows the practitioner to obtain precise measurements and detect minor volume changes in the affected arm. Its clinical relevance is unclear at this time.

TREATMENT

Treatment of acquired lymphedema remains frustrating for patient and physician alike. Since a cure is not yet available, therapies are directed toward reduction of limb size in order to preserve or restore function and cosmesis. Despite this, a rational assessment of treatment options permits the prescription of safe and potentially effective interventions. Therapy is difficult, multidisciplinary in nature, and, even in the best outcomes, costly and time consuming. Lymphedema management begins with a comprehensive evaluation of the extremity. Treatment plans addressing infections, limitations in range of motion, and impairment of activities of daily living should be instituted either before or concomitantly with reduction therapies. Psychosocial issues should also be addressed by appropriate referral for supportive care.

The treatments available for edema reduction may be divided into two general categories: external compression and surgery. Regimens of

intensive specialized massage and bandaging techniques, the so-called complex decongestive therapies, are utilized. Drug therapies have also been suggested. Other interventions have been recommended, including superficial heating and various diathermy techniques, but little evidence exists to support their use at this time.

The goal of therapy is to ease the amount of swelling experienced by the patient in order to retain or restore function and cosmesis to the affected limb. It is important to communicate with the patient that multiple modalities and an interdisciplinary approach are needed, and that a protracted course of therapy may be required in order to provide satisfactory control of swelling.

External Compression

Compression is defined for purposes of this review as application of any external pressure to the limb. The rationale for external compression in the management of edema is twofold. The compression may limit the amount of lymph formed.

Table 1.stilwell classification

Insignificant	0-10% > of normal arm
Slight	11-20%>of normal arm
Moderate	21-40%>of normal arm
Marked	41-80%>of normal arm
severe	More than 80%>of normal arm

Elevation

Elevation of an extremity reduces intravascular hydrostatic pressure. This in turn helps to reduce the tendency to form edema.

Compression garments

The use of elastic compression garments is widespread in the management of lymphedema. Garments may be prefabricated or custom made. Additionally, garments may be obtained that provide gradient pressures to the limb, in which the pressure exceed distally is somewhat greater than that applied to the more proximate part of the limb.2 Though not necessarily thought of as garments, bandaging and other wrapping techniques likely work on similar principles. There are few controlled data concerning the use of compression garment in the management of lymphedema. Compression garments may lessen the amount of edema formed within the involved extremity, and also lend a measure of protection against both intrinsic and extrinsic trauma to the limb. Garments may help reduce the amount of edema formed by increasing the interstitial hydrostatic pressures within the limb. This effect would theoretically impede lymph formation according to Starling's forces.' It is less clear whether compression garments facilitate lymph removal. Therefore, the likely benefit offered by compression garments is in easing the burden on the remaining functional lymphatics.

Garments also allow a measure of protection from incidental skin trauma such as minor bums, abrasions, and lacerations. Avoiding such minimal trauma may lessen acute exacerbations of swelling. More importantly, garments may act to protect the arm from intrinsic injury, the so-called cycle of edema,' by lessening the tendency for skin to stretch. Stretching of the skin likely occurs as a result of interstitial pressure being exerted on the skin. Over time, the skin's elastic nature eventually relaxes in response to the relentless forces being exerted on it. As this occurs, an accompanying reduction in the interstitial hydrostatic pressure permits the formation of additional edema. It is this cycle of increasing interstitial pressure followed by stretching of the skin which likely causes the gradual worsening in limb size experienced by many patients with lymphedema. Use of a garment or other type of wrap such as a bandage relieves the skin from bearing the pressure exerted by the accumulating interstitial edema and may therefore lessen the tendency to stretch. Selection of garment type and recommended guidelines for use remain unclear. There are no data supporting the value of customized over prefabricated garments. Prefabricated garments are usually less expensive than customized.

The use of a glove or gauntlet depends on whether the hand is swollen. If hand swelling becomes problematic or is brought on by the use of an arm sleeve, consideration should be given to either a long wrist piece

gauntlet or a one piece customized sleeve. Other indications for customized garments include patients who are difficult to fit or those in need of either a zipper or some other assistive device to facilitate donning of the garment. Garments typically last no more than 6 months; they should be replaced when they begin to lose their elasticity. Recommended guidelines for the use of garments are unclear. Pressures ranging from 30 to 60mm Hg may be employed. Use of the garment for up to 20 hours per day and longer has been suggested,‘” but there are no studies supporting or refuting this concept. Bertelli et al found statistically significant reduction of edema in patients who wore garments for 6 consecutive hours per day. Multivariate analysis of this group found superior reduction in those women who had not had significant weight gain following treatment for breast cancer.

Compliance is difficult for patients, as even the most customized garment is typically uncomfortable, unsightly, and laborious to put on. Patient education may improve compliance with the prescribed garment. Wrapping techniques have been described as part of a treatment regimen consisting of “complex physiotherapy others recommend bandaging as part of a comprehensive treatment program. Low-elasticity bandages are applied to edematous areas by technicians and provide a high degree of compression. They are then worn for several hours to several days, and are

often used in conjunction with exercise of the limb. Contraindications to the use of compression garments are few. Insensate extremities need to be inspected often to ensure skin integrity. Infections within the limb may make the use of garments more difficult because of pain. Open wounds should not be considered a contraindication. Complications from the use of compression garments include inducing or worsening hand swelling. Skin irritation may occur from contact dermatitis.

Pneumatic Compression

The application of external pneumatic "pumps" has been recommended for a number of years in the management of lymphedema. However, the optimum pumping pressures, the length and frequency of pumping sessions, and the need for continuation of pumping after initial reduction has been attained have yet to be determined. A number of commercially available pumps exist, which range widely in cost and complexity. Cost can vary from several hundred dollars for simpler devices to several thousand for more complex units. Pumps are available with both single chambers and multiple compartments. Multiple-chamber pumps are generally sequential in nature; they produce pressure on the limb by initially inflating distally and then moving proximally. This action theoretically forces edematous fluid to more proximal portions of the limb wherein better lymph removal may occur. Newer sequential pumps are

capable of generating gradient pressures. Pump selection and guidelines for their use are controversial. No individual pump appears to have a distinct advantage or to be inherently superior over any other. Studies exist in which individual pumps have been found to be beneficial in the treatment of edema. Pressures to be used as well as the length and frequency of individual pumping sessions have not been established. In a nonrandomized study, statistically significant reduction in edema was described with a sequential gradient pump when administered over a 48-hour period. The maximum distal pressures used were determined by calculating the mean of the systolic and diastolic blood pressures (mean 88.3mm Hg and most proximal, 48.7mm Hg).in 36 of 49 patients treated for lower extremity edema for a mean of 25 months. Contraindications include infection in the limb, local or proximate malignancy, anticoagulated patients, and deep vein thrombosis. Use of palliative pumping has been described in patients with advanced cancer in order to restore function and as an adjunct to pain control.

METHODOLOGY

DATA SOURCES:

Every patients admitted in Govt rajaji hospital in department of general surgery undergoing modified radical mastectomy.

STUDY DESIGN:

This is a comparative study in which patients are divided into two groups.

SAMPLE SIZE:

50 cases

DURATION :

10 months

AIM AND OBJECTIVES

To determine the effectiveness of physiotherapy in reducing the risk of lymphedema after mastectomy.

The efficacy of physiotherapy in reducing the lymphedema in postmastectomy patients is compared with control group who did not receive physiotherapy

DESIGN OF STUDY **:** COMPARATIVE STUDY

PERIOD OF STUDY **:** 10 MONTHS

CONSENT : Informed and written consent from all patients

ANALYSIS : Using CHI SQUARE test –p value

ELIGIBILITY CRITERIA **(FOR BOTH STUDY &CONTROL GROUPS)**

Inclusion criteria

1. Patients who had undergone unilateral mastectomy for stage 1 or 2 breast cancer.

2. Patients who are willing to participate in the study.

Exclusion criteria

1. Patients with locoregional and bilateral disease

2. Patients who are critically ill

This study is designed to determine the effectiveness of physiotherapy in reducing the lymphedema in postmastectomy patients .

For which 50 patients ,who were admitted between october 2016 to july 2017 (who met inclusion criteria) were selected.

Among 50 patients ,

25 patients – for experimental group

25 patients – for control group

- The control group did not receive any physiotherapy
- The study group were advised to do home based exercise from 10^{th} POD thrice daily.

FOLLOWING ARE THE HOME BASED EXERCISES

HAND WALL CLIMB

Fig 9 : HAND WALL CLIMB

Purpose

This stretch helps in regaining shoulder range-of motion, specifically to be able to reach up above your head.The primary muscle groups stretched in this exercise are the chest muscles (pectoralis), the underarm region (coracobrachialis), and the back muscle (latissimus dorsi)

- POSITION

Stand facing the wall, about a foot away. Place one hand on the wall at shoulder height. With your elbow kept straight, walk the hand up the wall

as high as you can to the point of tightness. If you can, step in towards the wall to increase the stretch.Hold for five seconds. Return to starting position

THINGS TO KEEP IN MIND

• First, walk the unaffected arm up the wall to get a sense of your range-of-motion. Then repeat with the operated arm.

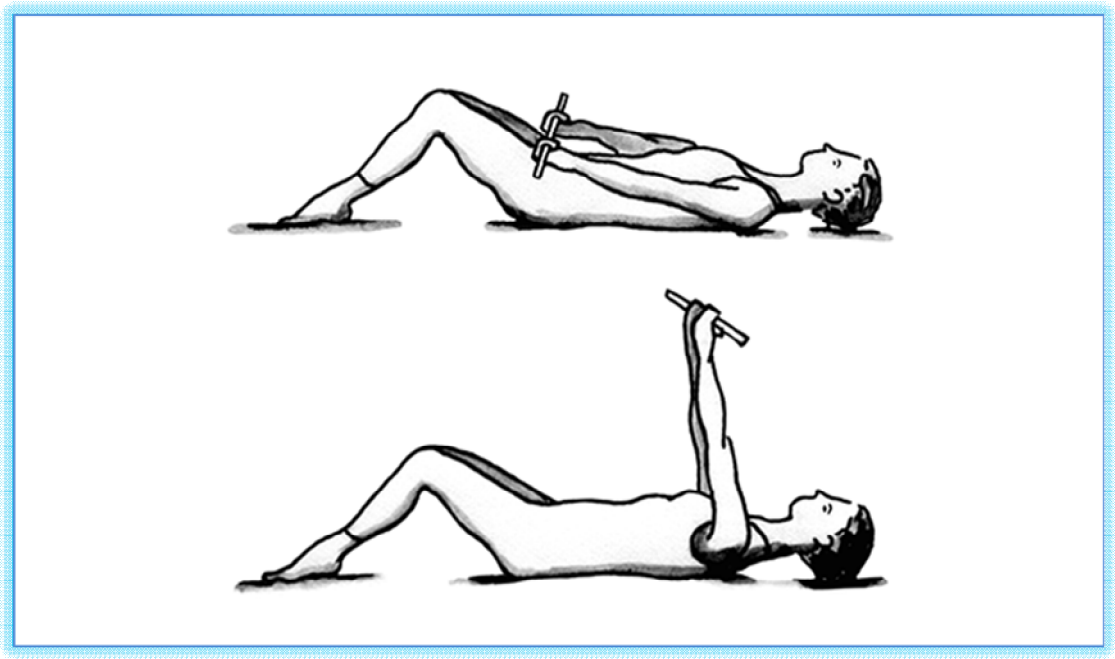
• If the unaffected arm achieves full range-of-motion easily,then just perform this exercise on the operated side.

• Stop at your point of tightness, then try to go a little farther.

NUMBER OF TIMES

Repeat each stretch three to five times at least once a day

Fig : 10 WAND EXERCISE



1. Lie on your back with knees bent & hold the wand with both hand & the hands should be width apart

2. Lift the wand over the head as far as you can

3. Hold the wand for 2to 3 seconds

4. Lower arm

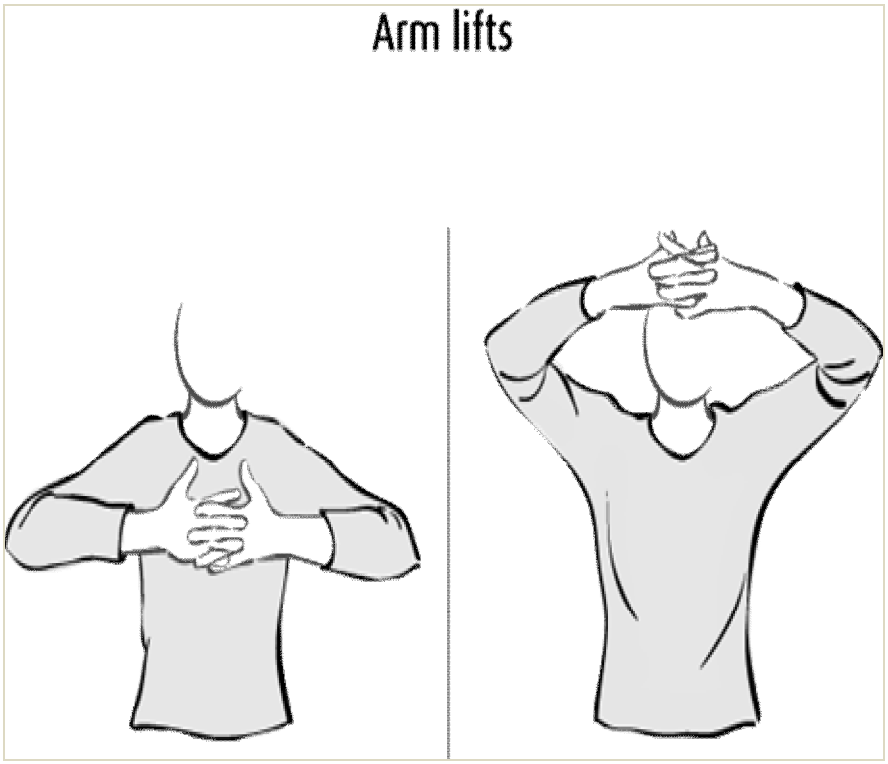


Fig 11 Arm Lifts

- Clasp your hands together in front of your chest with elbows pointing out
- Slowly lift your arm upward
- Hold for 1to 2 seconds
- Then return to starting point
- Muscle Groups involved:

Rhomboids, middle trapezius (scapular retraction), latissimus dorsi (shoulder extension), serratus anterior (scapular protraction), lower trapezius (scapular depression), biceps (elbow flexion), triceps

(elbow extension), forearm muscles (wrist flexion,extension)

- Frequency - 5 d/wk.

- Intensity - Start with light resistance 50%–60% of 10 repetition maximum weight progress within tolerance.
- Repetitions - 1 set of 8–10, increase gradually to 10–15.
- Sets - 1 set, progress to 2 sets; at 2 sets of 12–15 repetition

All patients were advised to do isotonic home based exercise after 10^{th} POD thrice daily

Measurements

All the measurements were taken at baseline and at the completion of weeks of the home-based exercise program.

Lymphedema Measurement

using circumferential measurements :

Patients using compression sleeves were advised to remove them 3 to 4 hours before the following measurements were taken Upper-limb circumference was taken using cloth measuring tape on bilateral upper-limbs at four levels, i.e., at the metacarpophalangeal joints, wrist joint,

15 cm distal to the lateral epicondyle, and 10 cm proximal to the lateral epicondyle.

- Patients were positioned prone with their upper limbs at their sides and their elbows straight while the circumference measurements were taken. Two measurements were taken and their mean was used.

RESULTS

PATIENT DEMOGRAPH

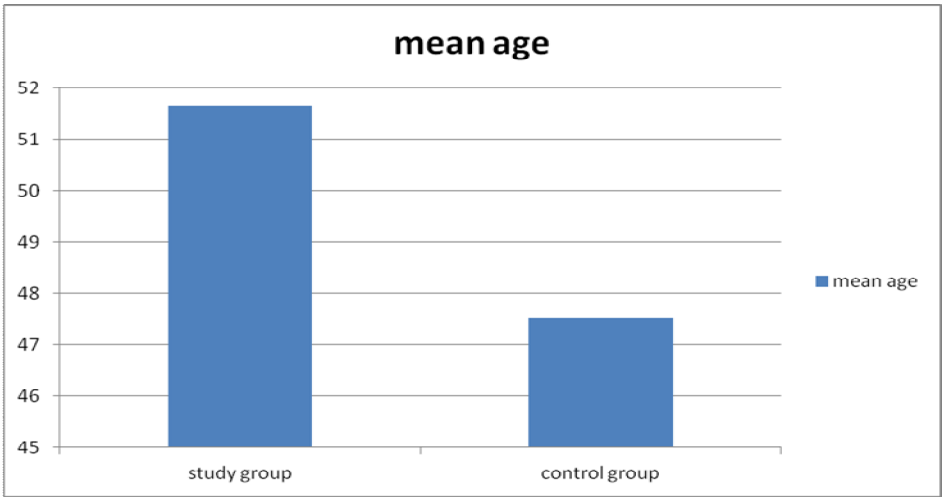
50 patients are randomized prospectively to either control group and study group for physiotherapy

Age (in years)	Study group	Control group
Mean+SD	51.64 ±8.14	47.52±8.76
Min,max	36,65	36,67

P value 0.091

The mean age of patients in study group is 47.52± 8.76 and control group is 51.64±8.14

Fig 12 Patient age group



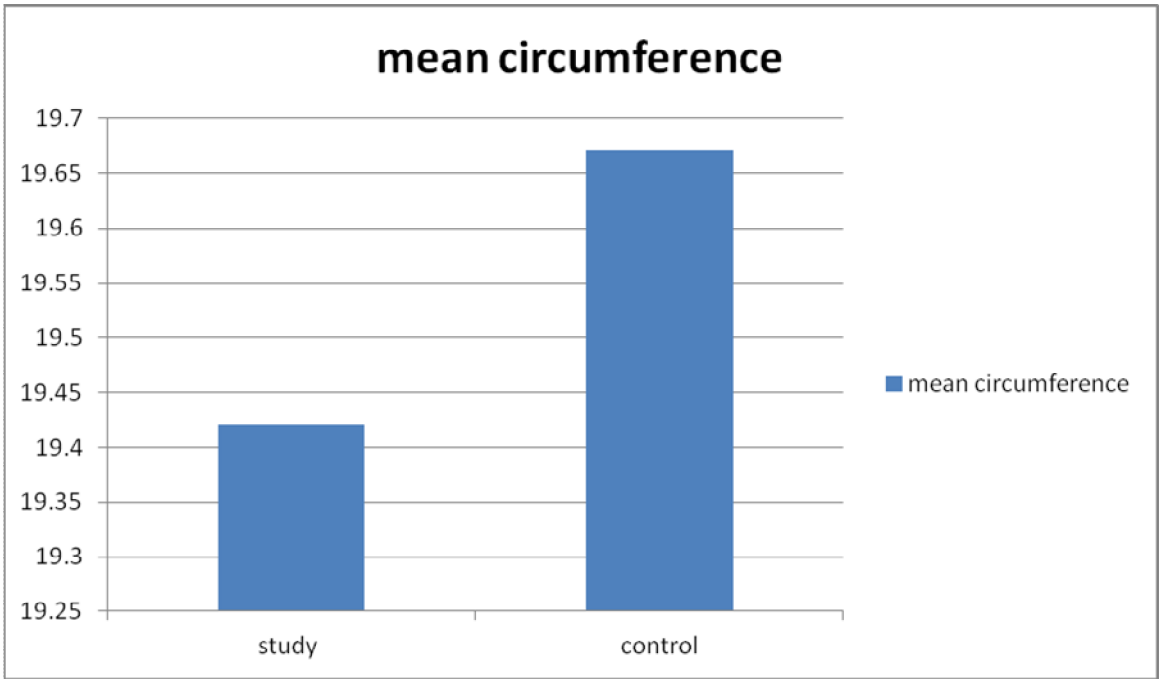
There were no significant differences between two groups with respect to patient demography.

MCP JOINT AT 10 TH POD

MCP JOINT (CIRCUMFERENCE)	STUDY GROUP	CONTROL GROUP
Mean + SD	19.42±0.49	19.67±0.46
Min;max	19,20.9	19,20.5
P value	0.07	

The mean circumference of MCP joint in study group is 19.42±0.49 and in control group is 19.67±0.46.

Fig 13 MCP circumference



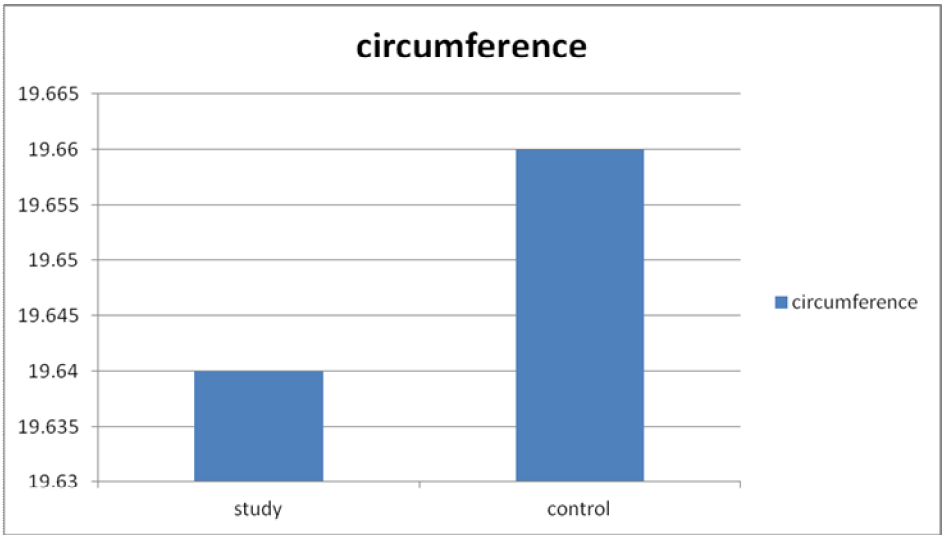
MCP CIRCUMFERENCE AT 4th week

MCP circumference	Study	Control
Mean + SD	19.64±0.49	19.66±0.49
Min,max	19,21	19,20.4

P value 0.909 not significant

The mean value of mcp circumference at 4th week for study group is 19.64±0.49 and for control group is 19.66±0.49

Fig 14 Mcp joint circumference at 4th week



The MCP circumference at 4th week between two group is not significant p value is 0.909

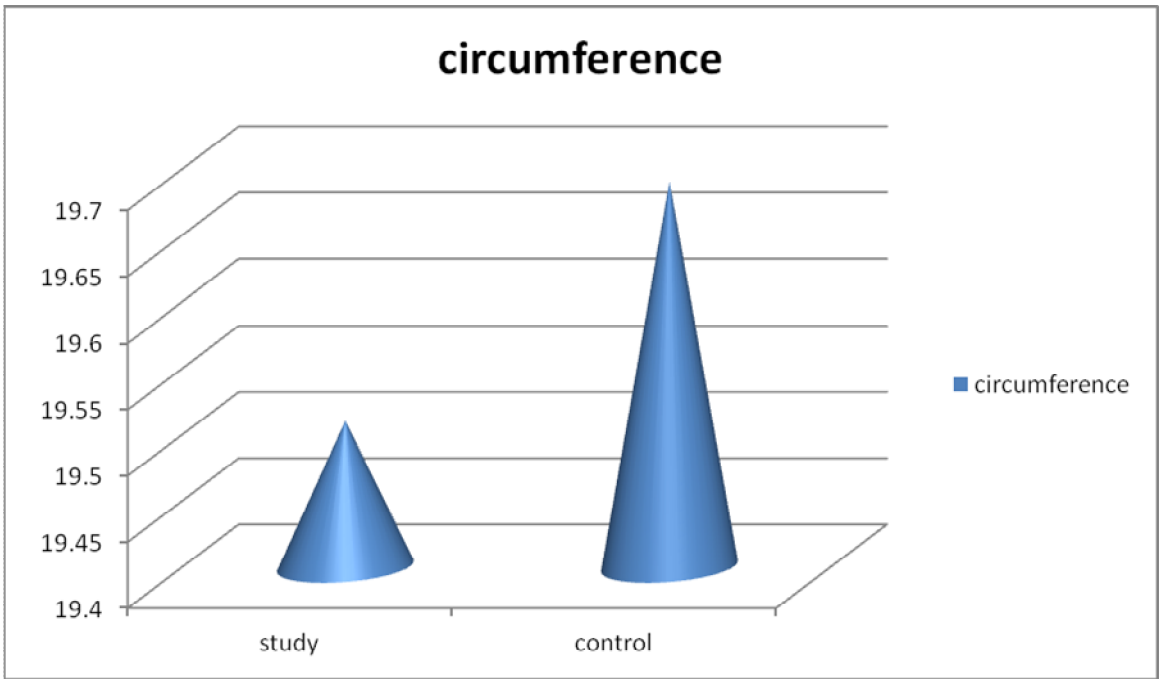
MCP joint circumference at 8th week

	study	control
Mean +SD	19.51±0.65	19.69±0.57
Min,max	19,21	19,20.9

P value 0.293

The mean MCP circumference at 8th week for study group is 19.51±0.65 and for control group is 19.69± 0.57

Fig 15 MCP circumference at 8th week



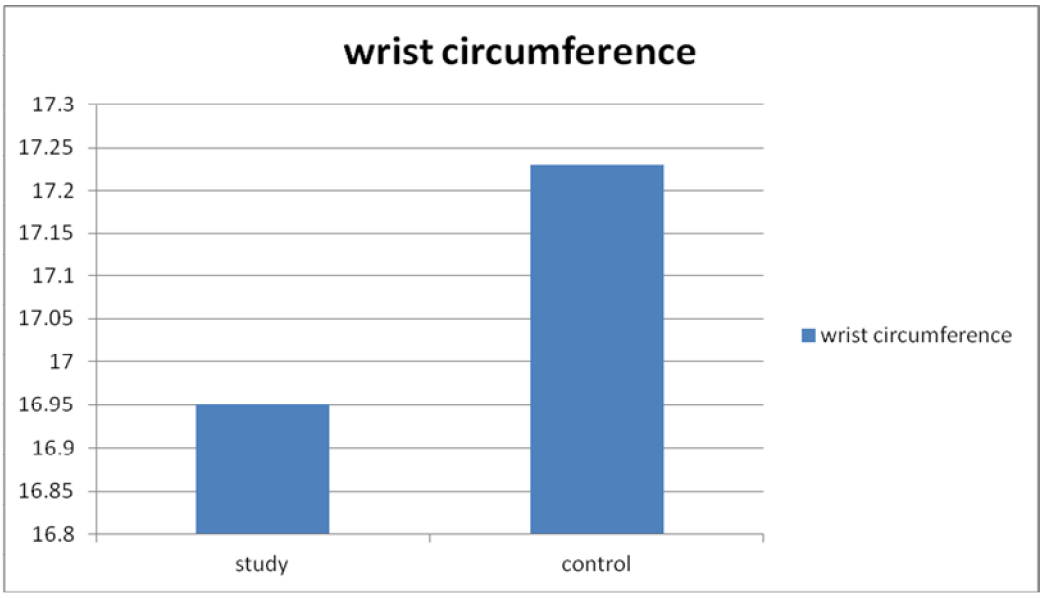
Since the p value is more than 0.001 there is no significant difference between study and control groups.

Wrist joint circumference at baseline

circumference	Study	Control
mean±SD	16.95±0.5	17.23±0.43
Min,max	16,18	16.4,18

P value is 0.042

Fig 16 Wrist joint circumference at baseline

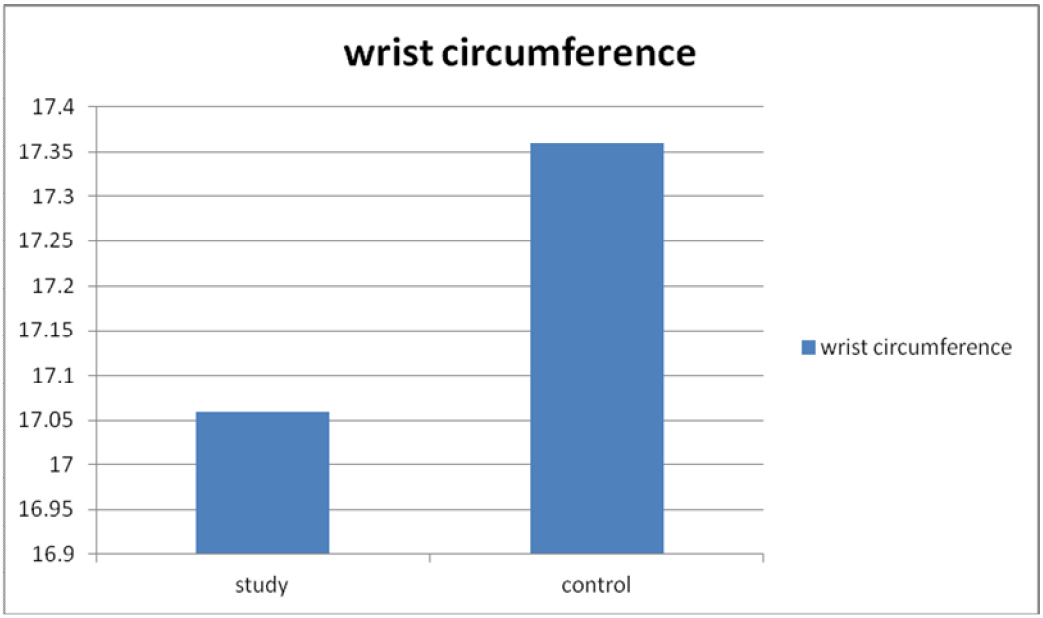


Wrist circumference at 4th week

circumference	Study	Control
mean±SD	17.06±0.57	17.36±0.43
Min,max	16,18	16.7,18

P value is 0.041

Wrist circumference at 4th week



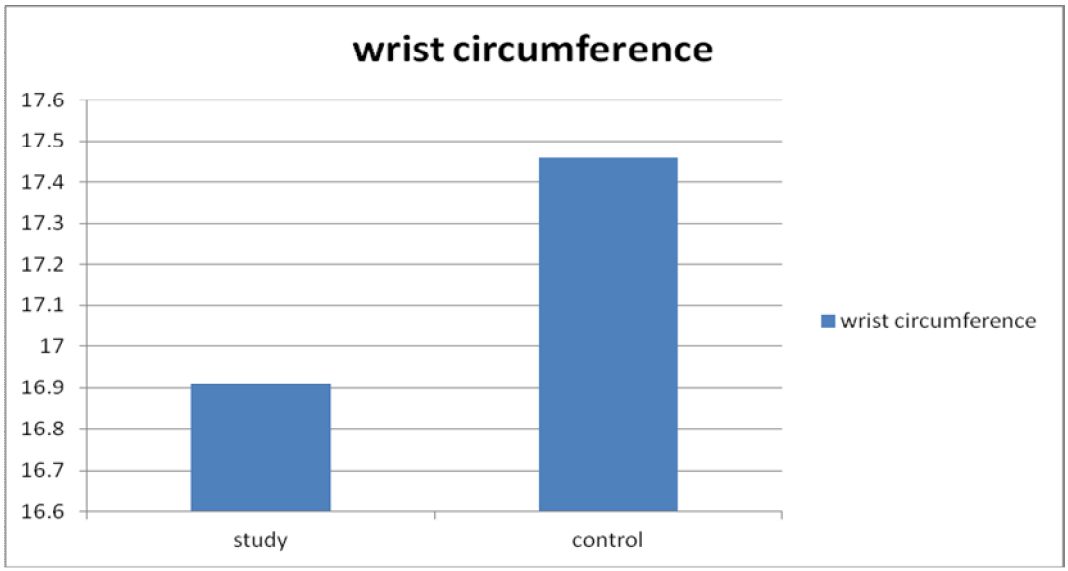
Since the p value is 0.041 there is no significant difference between two groups.

Wrist circumference at 8th week

Circumference In cm	Study	control
mean±SD	16.91±0.54	17.46±0.47
Min,max	16,17.8	16.6,18.3

P value <0.001 significant

Fig 18 Wrist circumference at 8th week



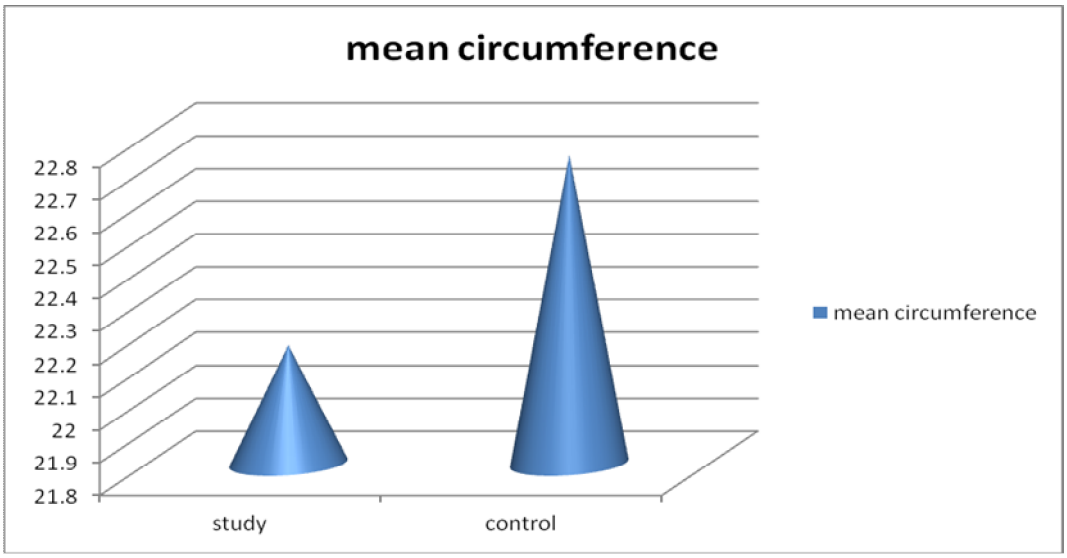
Since the p value is less than 0.001 there is significant difference between two groups.with respect to wrist circumference at 8th week.

15 cm distal to lateral epicondyle circumference at baseline

	STUDY	CONTROL
MEAN±SD	22.16±0.76	22.74±0.64
MIN,MAX	21,24	21.5,23.9

P VALUE 0.001 significant

15 cm distal to lateral epicondyle circumference at baseline



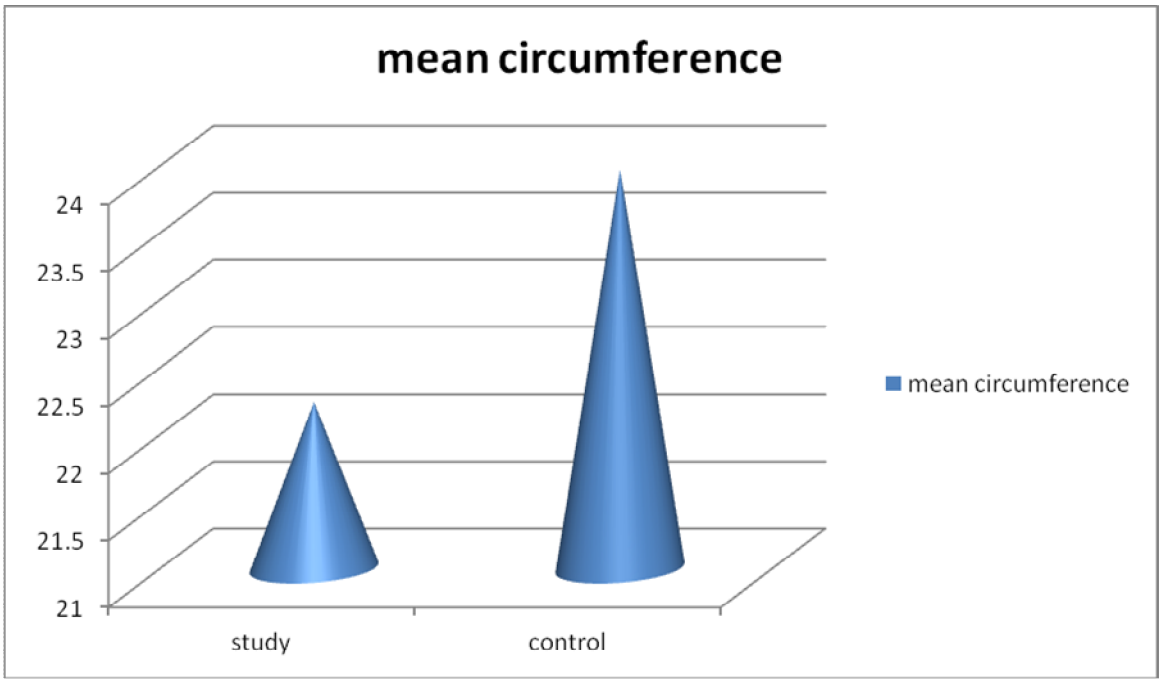
Since p value is less than 0.001there is significant difference in circumference 15 cm distal to lateral epicondyle between two groups.

15 cm distal to lateral epicondyle circumference at 4th week

	STUDY	CONTROL
MEAN±SD	22.24±0.72	23.97±1.17
MAX,MIN	21,24	22,25.9

P value <0.001

Fig 20: 15 cm distal to lateral epicondyle circumference at 4th week



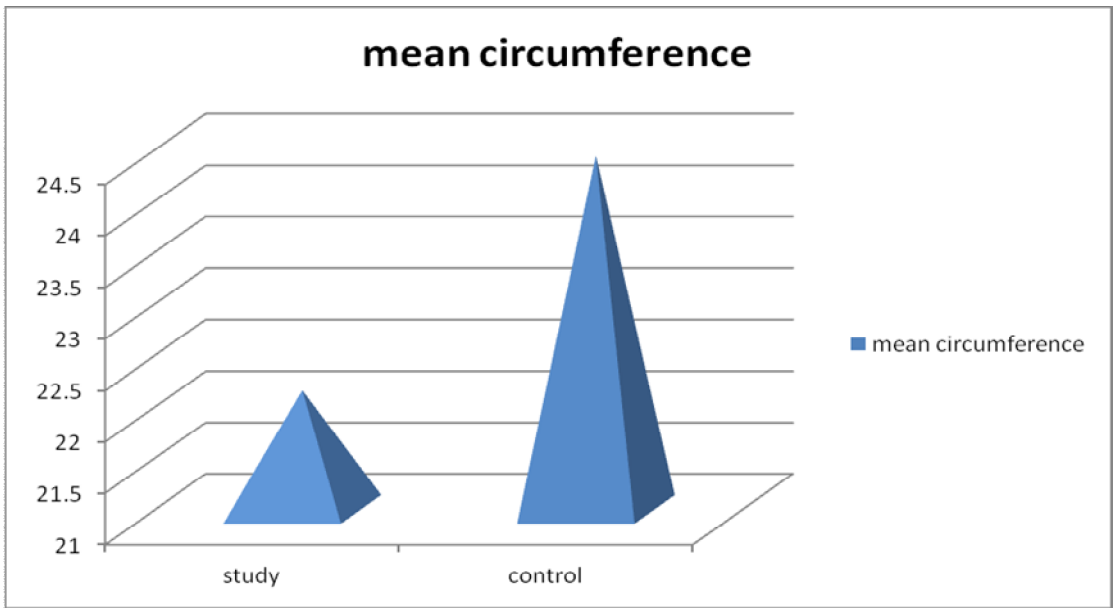
Since p value <0.001 there is significant difference between two groups.

15 cm distal to lateral epicondyle circumference at 8th week

	STUDY	CONTROL
MEAN±SD	22.16±0.81	24.44±0.93
MIN,MAX	21,24.6	22,26

P value < 0.001

Fig 21: 15 cm distal to lateral epicondyle circumference at 8th week

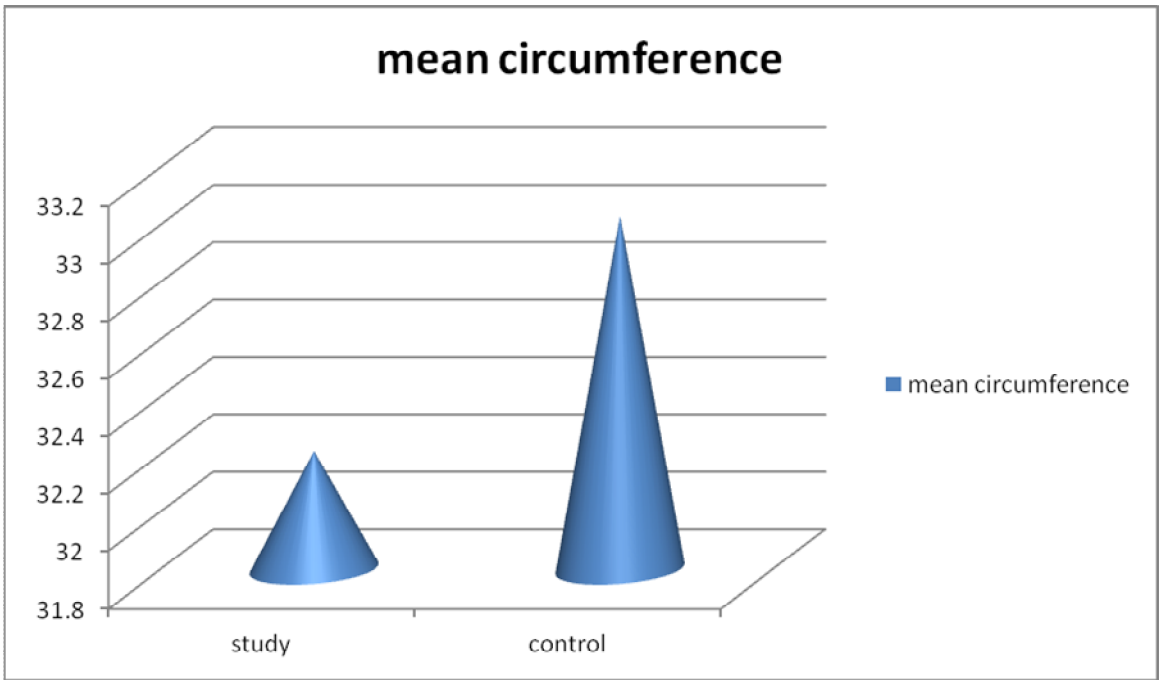


10cm proximal to lateral epicondyle circumference at baseline

	STUDY	CONTROL
MEAN±SD	32.21±0.91	33.03±0.85
MIN,MAX	30.06,34	31.5,35

P VALUE 0.002

Fig 22: 10cm proximal to lateral epicondyle circumference at baseline

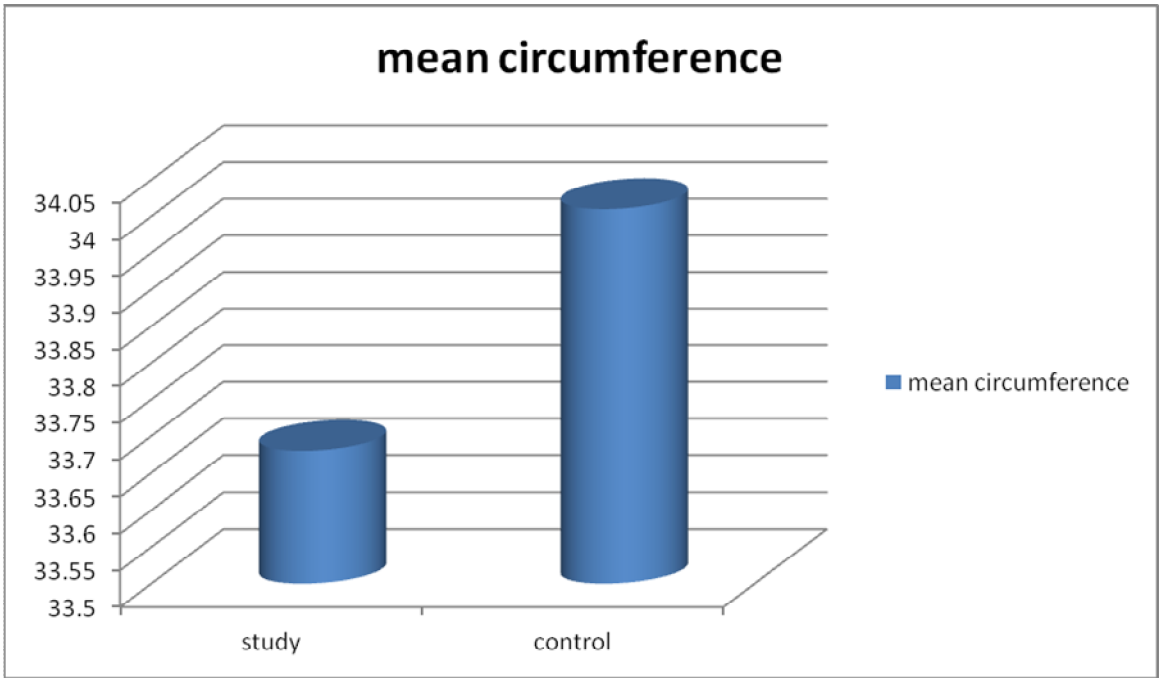


10cm proximal to lateral epicondyle circumference at 4th week

	STUDY	CONTROL
MEAN ±SD	33.68±1.08	34.01±1.11
MIN,MAX	31.6,35.5	32,35.9

P value 0.301 not significant

Fig 23: 10cm proximal to lateral epicondyle circumference at 4th week

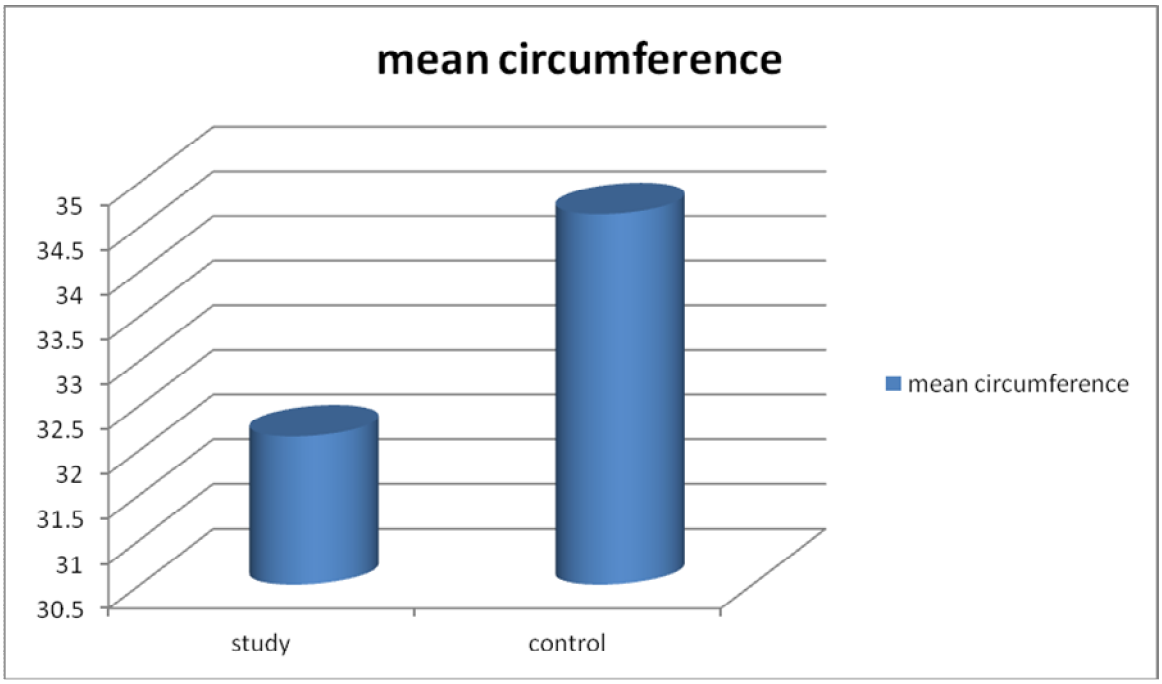


10cm proximal to lateral epicondyle circumference at 8th week

	STUDY	CONTROL
MEAN±SD	32.15±1.03	34.64±1.04
MIN,MAX	30,34.5	32,36

P VALUE <0.001

Fig 24: 10cm proximal to lateral epicondyle circumference at 8th week



There is a significant difference between two groups with respect to 10cm proximal to lateral epicondyle circumference at 8th week

CONCLUSION

Based on the observation made in this study, it is concluded that mean circumference of 10 cm distal to lateral epicondyle,15 cm proximal to lateral epicondyle, wrist joint is reduced in physiotherapy group when compared to control group after follow up but mean circumference of MCP joint does not show any difference.

This study showed that physiotherapy can effectively promote acute limb circumference reduction in patients with post mastectomy lymphedema, and when combined with self care results in long term control of lymphedema.

SUMMARY

Physiotherapy, when combined with long term self management proves effective in controlling post mastectomy lymphedema. Patient compliance to treatment protocols like, regular skin and nail care is very important in achieving and maintaining reduction in limb circumference following therapy. Based on the findings of the present research, it can be stated that aerobic exercise activity has a significant effect on shoulder joint mobility among patients affected by secondary lymphedema after breast cancer treatment.

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ANNEXURE

A COMPARATIVE STUDY ON POSTMASTECTOMY PATIENTS IN REDUCING LYMPHEDEMA - WITH & WITHOUT PHYSIOTHERAPY

PROFORMA

Name	:	I.P. No	:
Age	:	Unit	:
Sex	:	D.O.A	:
Occupation	:	D.O.Surgery	:
Address	:		
Phone No	:	D.O. D	

CHIEF COMPLAINTS:-

1. Lump:

2. Pain:

3. Discharge from nipple:

4. Retraction of nipple

5. trauma (to rule out - hematoma, traumatic fat necrosis)

6. swelling elsewhere

7. fever (mastitis)

8. loss of weight/appetite

9. bone pain

10. jaundice

11. breathlessness

12. cough with hemoptysis

PAST HISTORY:-

1) History of similar complaints
2) History suggestive of Hypertension / Diabetes / Tuberculosis / heart disease / jaundice / thyroid disorder.

PERSONAL HISTORY:-

Diet : Vegetarian / Mixed

Habits : Smoking / Alcohol / Tobacco

Bowel habits

FAMILY HISTORY:-

Relevant / Not

MENSTRUAL HISTORY:-

Amenorrhoea / menorrhagia

Regular / Not

Duration

Associated / Not with pain

L.M.P.

GENERAL PHYSICAL EXAMINATION : -

1. General survey
2. Body build and nourishment
3. Appearance
4. Attitude : Restless / Quiet
5. Dehydration : Mild/ Moderate / Severe / Nil
6. Anaemia / Jaundice / Clubbing Cyanosis / Lymphadenopathy / Pedal oedema.
7. Eye signs
8. Skin Changes
9. Pulse
10. Temperature
11. Respiratory rate
12. Blood pressure

LOCAL EXAMINATION:-

EXAMINATION OF BREAST

I. Inspection

1. *Breast*

– Position compared to opposite breast

– Size and shape

– Any mass

– Ulcer

2. *Skin over breast*

– Dilated veins

– Dimple/puckering/retraction

– Peau d'orange

– Nodules

– Ulceration/fungation

3. Nipple

4. *Areola*

5.. *Arms and thorax*

6. *Axilla*

7. *Supraclavicular fossa*

II. Inspection of the patient with arms raised above head

1. Peau d'orange

2. Fixity

3. Retraction of nipple

III. Inspection on leaning forward

– Fixity to chestwall

Palpation

1. Local temperature and tenderness

2. Swelling

Fluctuation (Cystic swellings only)

Tenderness

a. Fixity to skin

b. Intrinsic mobility

c. Fixity to muscles

d. Fixity to chestwall

EXAMINATION OF NIPPLE

EXAMINATION OF AXILLARY LYMPH NODE

SYSTEMIC EXAMINATION

Cardiovascular system

Respiratory System

Central nervous system

Genito - urinary system

Abdomen

INVESTIGATIONS:-

1. Blood : Hb%
2. TLC
3. DLC
4. BT
5. CT
6. ESR
7. Blood group and rh type.
8. Urine : Albumin / Sugar / Microscopy
9. Blood : sugar / Urea / creatinine
10. ECG
11. FNAC
12. MAMMOGRAM/USG BREAST
13. XRAY CHEST
14. SKELETAL BONE SURVEY
15. USG BREAST
16. USG abdomen and pelvis
17. Lipid profile
18. HIV
19. HbsAg
20. Others

DIAGNOSIS

MANAGEMENT

SURGICAL

Pre operative instructions

Type of Anaesthesia

Post - operative instructions

Post - operative period

Post - operative BIOPSY

S.No.	name case	age	mcp joint	4th week	8th week	wrist joint	4th week	8th week	15 cm DLE baseline	4th week	8th week	10 cm PLE	4th week	8th week
1	guna	54	20	20.3	20.6	16.6	16.7	16.6	22.7	22.7	24	32.7	32.7	34
2	sudha	37	20.4	20.5	20.5	17	17	17	22.6	22.9	25	32.9	32.9	35
3	keerthi	43	20.3	20.4	20.9	16.9	17	17.5	23	25.5	26	35	35.5	36
4	kani	56	20.3	20	20	16.4	16.8	16.9	22.5	24	24.8	33.9	34	34.8
5	ponni	60	20.2	20.4	20.7	17.1	17.6	17.8	23.7	23.9	23	33.7	33.9	33
6	karthika	63	19.9	19	19	17.6	17.8	17.9	22.9	24	24	34	34	34
7	meera	45	19.8	19.9	19.9	17.5	18	17.9	21.7	22	22.7	31.7	32	32.7
8	subha	64	19.7	19.7	19.7	17.2	17.8	17.9	21.6	22.6	22	31.6	32.6	32
9	rekha	45	19.6	19.7	19.7	17.4	17.8	17.9	21.9	22	23.9	31.9	32	33.9
10	saraswathi	47	19.6	19.5	19.5	17.8	17.8	18.3	22.9	24	23.9	32.9	34	33.9
11	devayani	55	19.5	19.5	19.5	17.9	18	18.1	22.8	24.7	25	32.8	34.7	35
12	kamakshi	67	19.4	19.4	19.4	17.5	17.7	17.9	22.8	25	24.8	33	35	35.9
13	latha	45	19.3	19.4	19.4	17.7	17.8	17.9	22.6	25.6	24.8	33.7	35.6	35.8
14	brinda	44	19.2	19.2	19.2	18	17.9	17.6	21.5	23	25.8	31.5	33	34
15	meena	47	19.3	19.3	19.3	16.8	17	17.1	22.8	24	24.9	32.8	34	34.9
16	buvana	48	19.9	19.9	19.9	17	17.6	17.9	22.7	22	24.8	32.7	33	34.8
17	syed beevi	54	20.5	20.5	20.5	17.4	17	17	22.4	24.5	24.7	32.4	34.7	35.9
18	muneeshwari	56	19	19	19	17.03	17	17	22	23	24	32.3	33	34
19	petchi	46	19.08	19.09	19	17.08	17.2	17.1	23	25	25.8	33	35	35.9
20	sundaravadivu	45	19.9	19.9	19.9	16.7	17	17.2	23.9	24.3	25	33.9	34	35
21	radhika	56	19.4	19.4	19.4	16.9	17	17.1	23.6	24.8	24	33.6	34.8	35.5
22	vadivu	64	19	19	19	17.2	17	17.1	23.5	24.9	24.1	33.5	34.9	35
23	rangamani	60	19	19	19	16.9	17	17	22.9	25	24.3	32.9	35	35
24	gohila	45	19.8	19.8	19.8	17.2	17	17	23	24	24.8	33.8	34	34.9
25	mangai	45	19.6	19.6	19.6	17.9	17.5	17.5	23.5	25.9	25	33.5	35.9	35

S.No.	name case	age	mcp joint	4th week	8th week	wrist joint	4th week	8th week	15 cm DLE baseline	4th week	8th week	10 cm PLE	4th week	8th week
1	jyothi	50	19	19.1	19	16.2	16.3	16	21.47	21.47	21	30.06	32	30
2	devi	55	19.03	19.04	19	16	16	16	21	21.5	21.7	31	32.3	30.5
3	muniammal	65	20.1	21	21	17	17	17	23	23	23	33	33.6	32
4	seetha	45	19.7	20	20	17.3	18	18	22.9	22.9	22.9	33.5	35	33
5	sangeetha	42	20.9	21	20.8	18	18	17.8	24	24	24.6	34	35.5	34.5
6	veerammal	54	19.04	20	20	16.9	17	16.9	21.1	21.5	21.2	31.1	32	31.2
7	mani	55	20.2	21	21	17.1	17.5	17	23	23	23	33	34	33
8	pappa	42	19.3	19.9	19.3	17	17	17	22.2	22.5	22.7	33.1	33.8	33
9	mary	54	19.1	19.9	19	17.1	17.5	17.3	22.3	22.4	22	33	34	33
10	fathima	58	19.4	19.5	19.4	17.5	17.5	17.5	22.3	22.5	22	32.3	34	32.5
11	vanitha	35	19.04	19.05	19	17.05	17.05	17.02	22	22	22	32.1	33	32.7
12	punitha	34	19.03	19.03	19	17.04	17.04	17	22.1	22.3	22	31	32.7	31
13	anu	37	19.05	19.05	19	17	17	17	22.6	22.5	22.9	32.6	32.5	32
14	vishnupriya	40	19.07	19.07	19	16.3	16.5	16.7	21	21	21	31.6	31.6	31
15	priya	36	19.4	19.5	19.4	17.3	17.6	17.5	22.5	22.4	22	32.5	34	32.7
16	kavitha	39	19.6	19.7	19.5	16.4	16.4	16.4	21.4	21.4	21.7	31.5	34.9	32
17	vimala	46	19.8	19.8	19.8	17	17	17	22	22	22	32.5	34	32.7
18	vinothini	45	19.08	19.08	19.08	17.1	17.4	17.2	22.98	23	22.6	32.7	35	31
19	ramu	55	19	19	19	16	16	16	21	21	21	31.5	33	31.1
20	tamil	56	19.5	19.8	19.8	16.7	16.8	16	21.7	21.9	21.6	31.7	34	31.5
21	chellamma	49	19.7	19.7	19.7	17.9	18	17	22.9	22.9	22.6	32.9	33.3	32.9
22	ponnammal	47	19.06	19	19	16.6	16.4	16.4	21.6	21.6	21.6	31.6	35	32
23	pushpam	59	19.4	19.4	19	17.3	17.5	17	22.3	22.3	22.3	32.3	34	32.5
24	radha	54	20	20.3	20	17	17	17	22	22	22	32	35	33
25	preetha	36	19	19	19	17	17	17	22.7	22.8	22.6	32.7	33.9	33

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ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.R.Mythili
Course	:	PG in MS., General Surgery
Period of Study	:	2014-2017
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	A comparative study on postmastectomy patients in reducing lymphedema – with & without physiotherapy
Ethical Committee as on	:	27.07.2017

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

Member Secretary Chairman Dean / Convenor

Prof Dr V Nagaraajan
M.D., MNAMS, D.M., Dsc.,(Neuro), Dsc (Hon)
CHAIRMAN
IEC - Madurai Medical College
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URKUND

Urkund Analysis Result

Analysed Document: Dr.Mythili GS.doc (D31237915)
Submitted: 10/12/2017 6:14:00 AM
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Significance: 4 %

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